PCB SOIL SAMPLING
QUALITY ASSURANCE PROJECT PLAN
BUFFALO WEAVING AND BELTING SITE
BUFFALO, ERIE COUNTY, NY

Prepared by
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Prepared for
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Region II - Response and Prevention Branch
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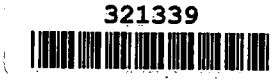

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1.0 INTRODUCTION

Presented herein is the Quality Assurance Project Plan (QAPP), for the soil sampling event to be conducted at the Buffalo Weaving and Belting Site by the Region II Removal Support Team (RST). This QAPP has been developed at the request of the United States Environmental Protection Agency (EPA) in accordance with the RST generic Quality Assurance Project Plan (QAPP).

This plan is based on information currently available and may be modified on site in light of field screening results and other acquired information. All deviations from the QAPP will be noted in the Sampling Trip Report.

2.0 PROJECT DESCRIPTION

The Buffalo Weaving and Belting Site is comprised of a series of interconnected buildings at 204-260 Chandler Street, located in Buffalo, Erie County, New York. The Site was most recently occupied by PharGo LLC, which ceased operations on January 17, 2003. Phargo Electric was closed by the Buffalo Economic Renaissance Corporation (BERC) at that time and was the mortgage holder for Phargo Electric. BERC had boarded and secured the buildings and recently prepared an inventory of hazardous substances.

A large fire in a significant portion of the complex of buildings occurred in the late evening of April 15, 2003. The fire was extinguished by April 16, 2003, leaving an unsecured, structurally unstable Site. A recent inventory of the facility conducted prior to the fire by the mortgage holder, (BERC), indicated the presence of approximately 100, 55-gallon drums containing potentially hazardous materials/substances including but not limited to oils, waste oils, hydraulic fluids, solvents, phenolic resins and unidentified cleaners. Inspections by NYSDEC staff conducted on April 17, 2003 indicated that some of the drums were not impacted by the fire, but are now unsecured and unprotected. Remnants of potentially hazardous wastes/substances may also remain in the fire zone. In addition, an estimated 50 smaller containers of similar materials were on-site. Approximately 200 - 300 feet of the central portions of the building were destroyed by the fire. The City of Buffalo erected barricades along Chandler Street and behind the Site buildings as a temporary measure to prevent site entry.

RST has recently provided air monitoring; bulk, transformer, and air sampling, and provided a drum inventory documenting 328 chemical containers and 481 drums and containers located on Site.

RST has been tasked by the EPA to collect soil samples:

1. To determine the presence/absence of PCB contaminated soils adjacent to the Building 17 transformer pad and,

2. To delineate any PCB contamination adjacent to the Building 17 transformer pad.

Surface soil samples will be collected at the locations determined by the EPA and confirmed by RST to be in Compliance with the New York State Department of Environmental Conservation's Draft DER-10 Technical Guidance for Site Investigation and Remediation, December 2002 (DER-10). All samples collected will be signed over to the ERRS contractor, WRS, following Chain of Custody protocols and submitted for laboratory analyses by WRS.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The EPA On-Scene Coordinator, Kevin Matheis, will provide overall direction to the staff concerning project sampling needs, objectives, and schedule. The Site Project Manager (SPM), Aaron Levy, will be the primary point of contact with the OSC. The SPM is responsible for the development and completion of the Sampling QA/QC Plan and any subsequent reporting and deliverables. The Site QC Coordinator will be responsible for ensuring field adherence to the Sampling QA/QC Plan and recording of any deviations. The ERRS contractor, WRS Infrastructure and Environment (WRS), will be the primary point of contact with the subcontracted laboratory, if necessary.

RST will transfer custody of the soil samples to WRS for shipment to the appropriate laboratory. The raw analytical data from the laboratory will be provided to WRS.

The following sampling personnel will work on this project:

Personnel	Responsibility
Kevin Matheis (EPA - OSC)	Overall Project Direction
Aaron Levy (RST)	Site Project Manager, Health and Safety, Site QA/QC, Sampling

The following laboratory will provide the following analyses:

Lab Name/Location	Sample Type	Parameters
GLA Laboratories 1008 West Ninth Avenue King of Prussia, PA 19406 Attn: Kristy Sheth (610) 337-9992	Soil - Grab	Polychlorinated Biphenyls (PCBs)

4.0 DATA USE OBJECTIVES, QA OBJECTIVES

In addition to the following, the Data Use Objectives, QA objectives procedure will be conducted in accordance with Sections A7, B2, B4, and B5 of the Region II RST QAPP.

RST will follow proper field sampling techniques. WRS is responsible for all shipping and laboratory QA objectives.

The primary objective of this sampling event is to determine the presence/absence of PCBs in site soils adjacent to the Building 17 transformer pad.

4.1 Data Use Objectives

The overall Quality Assurance (QA) objective for chemical measurement data associated with this sampling event is to provide analytical results that are legally defensible in a court of law. The RST QA program will incorporate Quality Control (QC) procedures for field sampling. WRS is responsible for QC procedure for shipping and analysis (chain of custody, laboratory analyses, and reporting to assure generation of sound analytical results).

The EPA OSC has specified a critical level of *QA-1* for all PCB soils analyses. Details of QA-1 level are provided below.

4.2 QA Objectives

The QA Protocols for a Level 1 QA objective sampling event are applicable to all sample matrices and include:

1. Sample documentation in the form of field logbooks, appropriate field data sheets, and chain of custody records (chain of custody records are optional for field screening locations).

2. Calibration of all monitoring and/or field-portable analytical equipment prior to collection and analyses of samples with results and/or performance check procedures/methods summarized and documented in a field, personal, and/or instrument log notebook.

3. Field or laboratory determined method detection limits (MDLs) will be recorded along with corresponding analytical sample results, where appropriate.

The objective of this project/event applies to the following parameters:

Table 1: Quality Assurance Objectives

QA Parameters	Matrix	Intended Use of Data	QA Objective
PCBs	Soil	Verify presence/absence PCB contaminated soils adjacent to the Building 17 transformer pad.	QA-1
PCBs	Soil	To delineate any PCB contamination found adjacent to the Building 17 transformer pad.	QA-1

A field sampling summary is provided in Table 2 and a QA/QC Analysis and Objectives Summary is included in Table 3. Section 5.1, Sampling Design, provides information on analyses to be performed on the soil samples collected.

TABLE 2
FIELD SAMPLING SUMMARY

Analytical Parameters	Matrix	Container Size	Preservative	Holding Time[1]	Subtotal Samples	Field Blanks[2]	Duplicate Samples[3]	MS/MSD Samples[3]	Total Field Samples
PCBs	Soil	8 - oz. Glass	Cool to 4°C	7 days for extraction; 40 days after	9	NA	NA	NA	9

1 Holding time from date of sampling.
2 Only required if non-dedicated sampling equipment to be used. NR - not required, dedicated sampling equipment to be used.
3 Not required

TABLE 3
QA/QC ANALYSIS AND OBJECTIVES SUMMARY

Analytical Parameters	Matrix	Analytical Method Reference	QA/QC Quantitation Limits	QA Objective
PCBs	Soil	SW 846, Method 8082	as per method	QA -1

Note: CLP-format deliverables required for all data packages.

5.0 APPROACH AND SAMPLING PROCEDURES

In addition to the following, the approach and sampling procedures will be conducted in accordance with Section B1 and B4 of the Region II RST QAPP.

The following sampling activities will be conducted at the Buffalo Weaving and Belting, Site:

- Soil Sampling

The following sampling design is based on information currently available and may be modified on site in light of field screening results and other acquired information. All deviations from the sampling plan will be noted in the Sampling Trip Report.

5.1 Sampling Design

In order to verify the presence or absence of PCB contaminated soils adjacent to the Building 17 transformer pad, nine surface soil samples will be collected by RST. Sample locations will be as indicated in the diagram to the right.

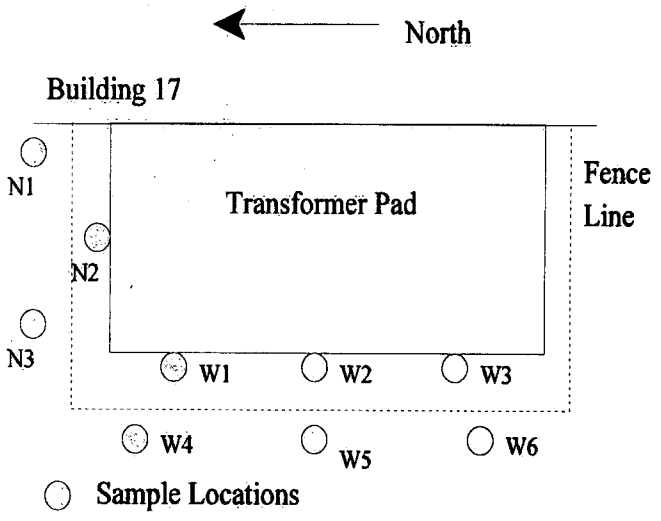


Figure 1

Sampling points will be selected to the north, and west of the transformer pad. The pad is approximately 15' by 8'. The NYSDEC requires 1 sample be collected every 30' for each side of the pad. No samples will be collected to the east of the pad, Building 17, and to the south of the pad, residential properties. The soil samples will be collected at a depth of 0-2" below the vegetative layer as required by the DER-10. When results have been reviewed by the OSC additional sampling may be required.

RST will collect all samples using glassware provided by the ERRS Contractor. Once collected, samples will be transferred under a Chain of Custody to the ERRS Contractor, WRS, who will be responsible for packaging and shipment to the laboratory. The ERRS Contractor is responsible for the laboratory procurement.

5.2 Schedule of Activities

Proposed Start Date	Activity	End Date
October 30, 2003	Soil Sampling	October 30, 2003

5.3 Sampling Equipment

Soil samples will be collected using dedicated disposable scoops and spatulas.

5.4 Sample Identification System

Each sample collected by Region II RST will be designated by a code which will identify the site. The code will be a site-specific project tracking code. The code for the Buffalo Weaving and Belting Site is BWB. Following the project tracking code will be the abbreviation of the area:

TP- for transformer pad initial samples
TD- for transformer area delineation samples

Following the area abbreviation will be a direction indicator and sequential numbers, (indicating the location of the sample as follows):

Northeast Sample - N1
North Sample - N2
Northwest Sample - N3

An example of a sample from the transformer pad will be identified as BWB-TP-N1.

5.5 Standard Operating Procedures (SOPs)

5.5.1 Sample Documentation

All sample documents will be completed legibly, in ink. Any corrections or revisions will be made by lining through the incorrect entry and by initialing the error.

FIELD LOGBOOK

The field logbook is essentially a descriptive notebook detailing site activities and observations so that an accurate account of field procedures can be reconstructed in the writer's absence. All entries will be dated and signed by the individuals making the entries, and should include (at a minimum) the following:

1. Site name and project number.
2. Name(s) of personnel on site.
3. Dates and times of all entries (military time preferred).
4. Descriptions of all site activities, site entry and exit times.
5. Noteworthy events and discussions.
6. Weather conditions.
7. Site observations.
8. Sample and sample location identification and description*.
9. Subcontractor information and names of on-site personnel.
10. Date and time of sample collections, along with chain of custody information.
11. Record of photographs.
12. Site sketches.

The description of the sample location will be noted in such a manner as to allow the reader to reproduce the location in the field at a later date.

SAMPLE LABELS

Sample labels will clearly identify the particular sample, and should include the following:

1. Site/project number.
2. Sample identification number.
3. Sample collection date and time.
4. Designation of sample (grab or composite).
5. Sample preservation.
6. Analytical parameters.
7. Name of sampler.

Sample labels will be written in indelible ink and securely affixed to the sample container. Tie-on labels can be used if properly secured.

CUSTODY SEALS

Custody seals demonstrate that a sample container has not been tampered with, or opened. The

individual in possession of the sample(s) will sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the sample packaging, will be noted in the field logbook.

5.5.2 Sampling SOPs

Soil Sampling

Soil sampling activities will be conducted in accordance with guidelines outlined in the following SOP's in Attachment A and B of the QAPP:

EPA/ERT Soil Sampling SOP No. 2012 (Attachment A)
NYSDEC Draft DER 10 Technical Guidance for Site Investigation and Remediation, December 10, 2002 (Attachment B)

5.5.3 Sample Handling and Shipment

Each of the sample bottles will be sealed and labeled according to the following protocol. Caps will be secured with custody seals. Bottle labels will contain all required information including site/project code and sample number, time and date of collection, analyses requested, and preservative used. Sealed bottles will be placed in large metal or plastic coolers, and padded with an absorbent material such as vermiculite. All packaging will conform to IATA Transportation regulations for overnight carriers.

All sample documents will be sealed in a plastic bag and affixed to the underside of each cooler lid. The lid will be sealed and affixed on at least two sides with custody seals so that any sign of tampering is easily visible.

For this sampling event, RST collected the samples and transferred the samples to WRS for shipping and analysis.

5.6 Sample Containers

The ERRS contractor will supply all sample containers.

5.7 Disposal of PPE and Contaminated Sampling Materials

All used PPE and disposable sampling equipment will be properly disposed of during this ongoing removal action.

6.0 CHAIN OF CUSTODY RECORD

In addition to the following, the sample custody procedure will be conducted in accordance with Section B3 of the Region II RST QAPP.

RST will maintain a chain of custody record from the time the sample is taken to the time it is

transferred to the ERRS contractor for processing. Every transfer of custody must be noted and signed for, and a copy of this record kept by each individual who has signed. When samples (or groups of samples) are not under direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. Specific information regarding custody of the samples projected to be collected on the weekend will be noted in the field logbook.

The chain of custody record should include (at minimum) the following:

1.Sample identification number.
2.Sample information.
3. Sample location.
4. Sample date.
5. Name(s) and signature(s) of sampler(s).
6.Signature(s) of any individual(s) with control over samples.

A separate chain of custody form must accompany each shipping container for each daily shipment. The chain of custody form must address all samples in that shipping container, but not address samples in any other shipping container. This practice maintains the chain of custody for all samples in case of mis-shipment.

7.0 FIELD INSTRUMENT CALIBRATION AND PREVENTIVE MAINTENANCE

In addition to the following, the Field Instrument and Preventative Maintenance procedure will be conducted in accordance with Section B6 of the Region II RST QAPP.

The sampling team is responsible for assuring that a calibration/maintenance log will be brought into the field and maintained for each measuring device. Each log will include at a minimum, where applicable:

- name of device and/or instrument calibrated
- device/instrument serial and/or ID number
- frequency of calibration
- date of calibration
- results of calibration
- name of person performing the calibration
- identification of the calibrant (PID, FID, pH meter)

Equipment to be used each day will be calibrated prior to the commencement of daily activities.

8.0 ANALYTICAL PROCEDURES

Analytical methods to be utilized in the analyses of samples collected during this sampling event are detailed in Table 3.

9.0 DATA REDUCTION, VALIDATION AND REPORTING

In addition to the following, the Data Reduction, Validation, and Reporting procedure will be conducted in accordance with Sections D1, D2 and D3 of the Region II RST QAPP.

9.1 Deliverables

The RST SPM, Aaron Levy, will maintain contact with the EPA OSC, Kevin Matheis, to keep him informed about the technical progress of this project. This communication will commence with the issuance of the work assignment and project scoping meeting. Activities under this project will be reported in the final report and other deliverables described herein. Activities will also be summarized in appropriate format for inclusion in monthly and annual reports.

The following deliverables will be provided under this project:

TRIP REPORT

A trip report will be prepared to provide a detailed accounting of what occurred during each sampling mobilization. The trip report will be prepared within one week of the last day of each sampling mobilization. Information will be provided on time of major events, dates, and personnel on site (including affiliations).

MAPS/FIGURES

Maps depicting site layout, contaminant source areas, and sample locations will be included in the trip report, as appropriate.

ANALYTICAL REPORT

An analytical report will be prepared for samples analyzed under this plan. Information regarding the analytical methods or procedures employed, sample results, QA/QC results, chain of custody documentation, laboratory correspondence, and raw data will be provided within this deliverable. The ERRS contractor is providing the analytical report.

DATA REVIEW

A review of the data generated under this plan will be undertaken. The assessment of data acceptability or usability will be provided separately, or as part of the analytical report by the ERRS Contractor.

9.2 Data Validation

QA-1 data need only be evaluated for calibration and detection limits criterion. The ERRS contractor is responsible for ensuring data validation under this plan.

10.0 FIELD QA/QC CHECK SAMPLES AND FREQUENCY

In addition to the following, the Field Quality Control Checks and Frequency procedure will be

conducted in accordance with Section B7 of the Region II RST QAPP.

11.0 SYSTEM AUDIT

In addition to the following, the System Audit procedure will be conducted in accordance with Section C1 of the Region II RST QAPP.

The Field QA/QC Officer will observe sampling operations and review subsequent analytical results to ensure compliance with the QA/QC requirements of the project/sampling event.

12.0 CORRECTIVE ACTION

In addition to the following, the Corrective Action procedure will be conducted in accordance with Section C1 of the Region II RST QAPP.

All provisions will be taken in the field to ensure that any problems that may develop will be dealt with as quickly as possible to ensure the continuity of the project/sampling events. Any deviations from this sampling plan will be noted in the final report.

ATTACHMENT A

EPA/ ERT SOIL SAMPLING SOP NO. 2012

U. S. EPA ENVIRONMENTAL RESPONSE TEAM

STANDARD OPERATING PROCEDURES

SOIL SAMPLING

CONTENTS

SUPERCEDES: SOP #2012; Revision 0.0; 11/16/94; U.S. EPA Contract 68-C4-0022.

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. Sampling depths are assumed to be those that can be reached without the use of a drill rig, direct-push, or other mechanized equipment (except for a back-hoe). Analysis of soil samples may determine whether concentrations of specific pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the actual procedures used should be documented and described in an appropriate site report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment depending on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Samples should, however, be cooled and protected from sunlight to minimize any potential reaction. The amount of sample to be collected and proper sample container type are discussed in ERT/REAC SOP #2003 Rev. 0.0 08/11/94, *Sample Storage, Preservation and Handling.*

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary potential problems associated with soil sampling - cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample, or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

5.0 EQUIPMENT

Soil sampling equipment includes the following:

- Maps/plot plan
- Safety equipment, as specified in the site-specific Health and Safety Plan
- Survey equipment or global positioning system (GPS) to locate sampling points
- Tape measure
- Survey stakes or flags
- Camera and film
- Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan
- Appropriate size sample containers
- Ziplock plastic bags
- Logbook
- Labels
- Chain of Custody records and custody seals
- Field data sheets and sample labels
- Cooler(s)
- Ice
- Vermiculite
- Decontamination supplies/equipment
- Canvas or plastic sheet
- Spade or shovel
- Spatula
- Scoop
- Plastic or stainless steel spoons
- Trowel(s)
- Continuous flight (screw) auger
- Bucket auger
- Post hole auger
- Extension rods
- T-handle
- Sampling trier
- Thin wall tube sampler
- Split spoons
- Vehimeyer soil sampler outfit
  - Tubes
  - Points
  - Drive head
  - Drop hammer
  - Puller jack and grip
- Backhoe

6.0 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in ERT/REAC SOP #2006 Rev. 0.0 08/11/94, *Sampling Equipment Decontamination*, and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.
2. Obtain necessary sampling and monitoring equipment.
3. Decontaminate or pre-clean equipment, and ensure that it is in working order.
4. Prepare schedules and coordinate with staff, client, and regulatory agencies, if appropriate.
5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.
6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminant, should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations should be utility-cleared by the property owner or the On-Scene-Coordinator (OSC) prior to soil sampling; and utility clearance should always be confirmed before beginning work.

7.2 Sample Collection

7.2.1 Surface Soil Samples

Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material is removed to the required depth and a stainless steel or plastic scoop is then used to collect the sample.

This method can be used in most soil types but is limited to sampling at or near the ground surface. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A flat, pointed mason trowel to cut a block of the desired soil is helpful when undisturbed profiles are required. Tools plated with chrome or other materials should not be used. Plating is particularly common with garden implements such as potting trowels.

The following procedure is used to collect surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.

3. If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers

This system consists of an auger, or a thin-wall tube sampler, a series of extensions, and a "T" handle (Figure 1, Appendix A). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin wall tube sampler. The system is then lowered down the borehole, and driven into the soil to the completion depth. The system is withdrawn and the core is collected from the thin wall tube sampler.

Several types of augers are available; these include: bucket type, continuous flight (screw), and post-hole augers. Bucket type augers are better for direct sample recovery because they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights. The continuous flight augers are satisfactory when a composite of the complete soil column is desired. Post-hole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil and cannot be used below a depth of approximately three feet.

The following procedure is used for collecting soil samples with the auger:

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first three to six inches of surface soil for an area approximately six inches in radius around the drilling location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.

4. After reaching the desired depth, slowly and carefully remove the auger from the hole. When sampling directly from the auger, collect the sample after the auger is removed from the hole and proceed to Step 10.

5. Remove auger tip from the extension rods and replace with a pre-cleaned thin wall tube sampler. Install the proper cutting tip.

6. Carefully lower the tube sampler down the borehole. Gradually force the tube sampler into the soil. Do not scrape the borehole sides. Avoid hammering the rods as the vibrations may cause the boring walls to collapse.

7. Remove the tube sampler, and unscrew the drill rods.

8. Remove the cutting tip and the core from the device.

9. Discard the top of the core (approximately 1 inch), as this possibly represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container. Sample homogenization is not required.

10. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly.

    When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.

12. Abandon the hole according to applicable state regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

7.2.3 Sampling with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

The following procedure is used to collect soil samples with a sampling trier:

1. Insert the trier (Figure 2, Appendix A) into the material to be sampled at a 0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.

2. Rotate the trier once or twice to cut a core of material.

3. Slowly withdraw the trier, making sure that the slot is facing upward.

4. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler

Split spoon sampling is generally used to collect undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted.

When split spoon sampling is performed to gain geologic information, all work should

be performed in accordance with ASTM D1586-98, "Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils".

The following procedures are used for collecting soil samples with a split spoon:

1. Assemble the sampler by aligning both sides of barrel and then screwing the drive shoe on the bottom and the head piece on top.

2. Place the sampler in a perpendicular position on the sample material.

3. Using a well ring, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.

4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.

5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. The amount of recovery and soil type should be recorded on the boring log. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler is typically available in 2 and 3 1/2 inch diameters. A larger barrel may be necessary to obtain the required sample volume.

6. Without disturbing the core, transfer it to appropriate labeled sample container(s) and seal tightly.

7.2.5 Test Pit/Trench Excavation

A backhoe can be used to remove sections of soil, when detailed examination of soil characteristics are required. This is probably the most expensive sampling method because of the relatively high cost of backhoe operation.

The following procedures are used for collecting soil samples from test pits or trenches:

1. Prior to any excavation with a backhoe, it is important to ensure that all sampling locations are clear of overhead and buried utilities.

2. Review the site specific Health & Safety plan and ensure that all safety precautions including appropriate monitoring equipment are installed as required.

3. Using the backhoe, excavate a trench approximately three feet wide and approximately one foot deep below the cleared sampling location. Place excavated soils on plastic sheets. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.

4. A shovel is used to remove a one to two inch layer of soil from the vertical face of the pit where sampling is to be done.

5. Samples are taken using a trowel, scoop, or coring device at the desired intervals. Be sure to scrape the vertical face at the point of sampling to remove any soil that may have fallen from above, and to expose fresh soil for sampling. In many instances, samples can be collected directly from the backhoe bucket.

6. If volatile organic analyses are required, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7. Abandon the pit or excavation according to applicable state regulations. Generally, shallow excavations can simply be backfilled with the removed soil material.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration

activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OHSA and corporate health and safety procedures, in addition to the procedures specified in the site specific Health & Safety Plan..

12.0 REFERENCES

Mason, B.J. 1983. Preparation of Soil Sampling Protocol: Technique and Strategies. EPA-600/4-83-020.

Barth, D.S. and B.J. Mason. 1984. Soil Sampling Quality Assurance User's Guide. EPA-600/4-84-043.

U.S. Environmental Protection Agency. 1984 Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. EPA-600/4-84-076.

de Vera, E.R., B.P. Simmons, R.D. Stephen, and D.L. Storm. 1980. Samplers and Sampling Procedures for Hazardous Waste Streams. EPA-600/2-80-018.

ASTM D 1586-98, ASTM Committee on Standards, Philadelphia, PA.

APPENDIX A
Figures
SOP #2012
February 2000

FIGURE 1. Sampling Augers

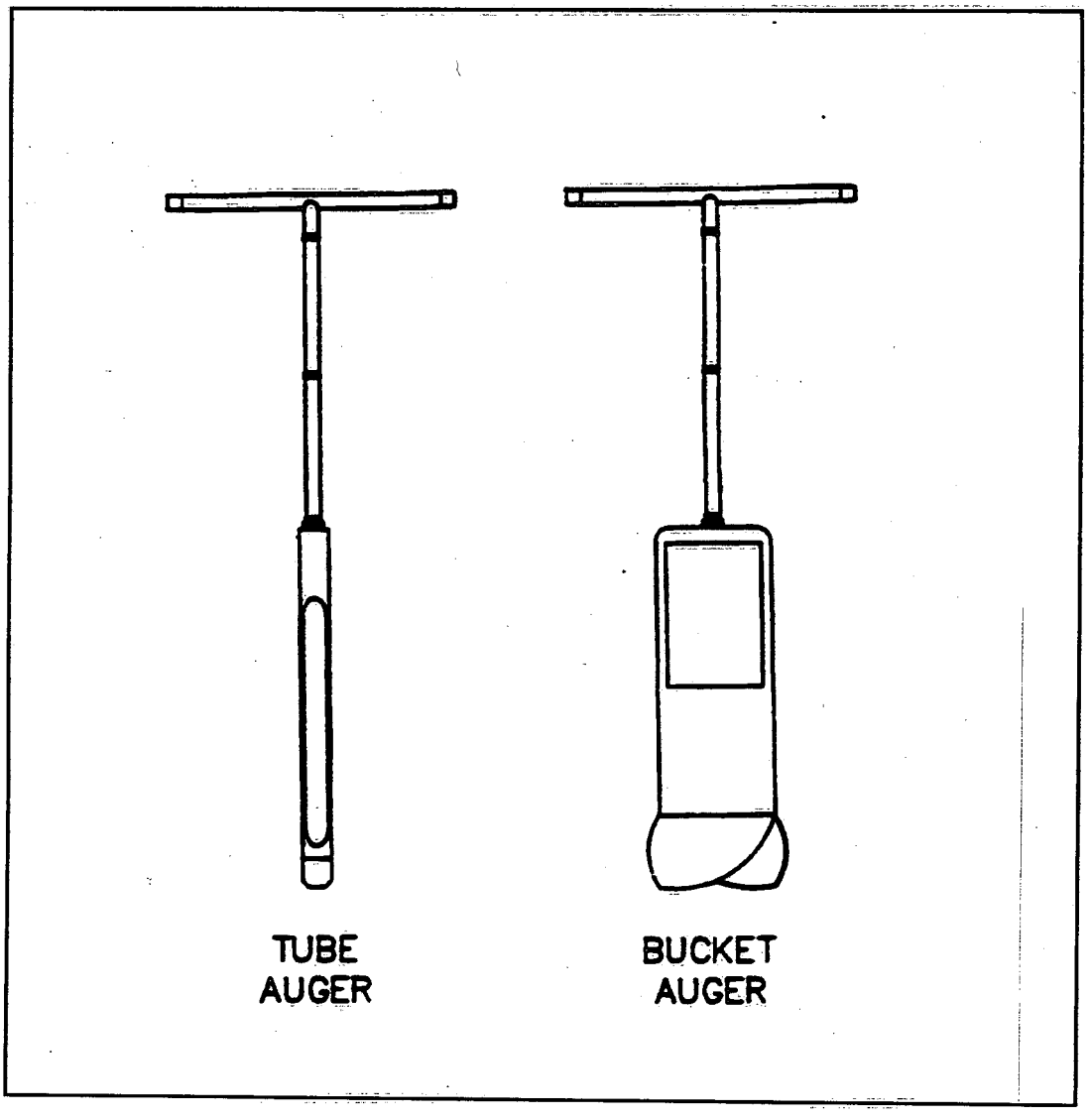
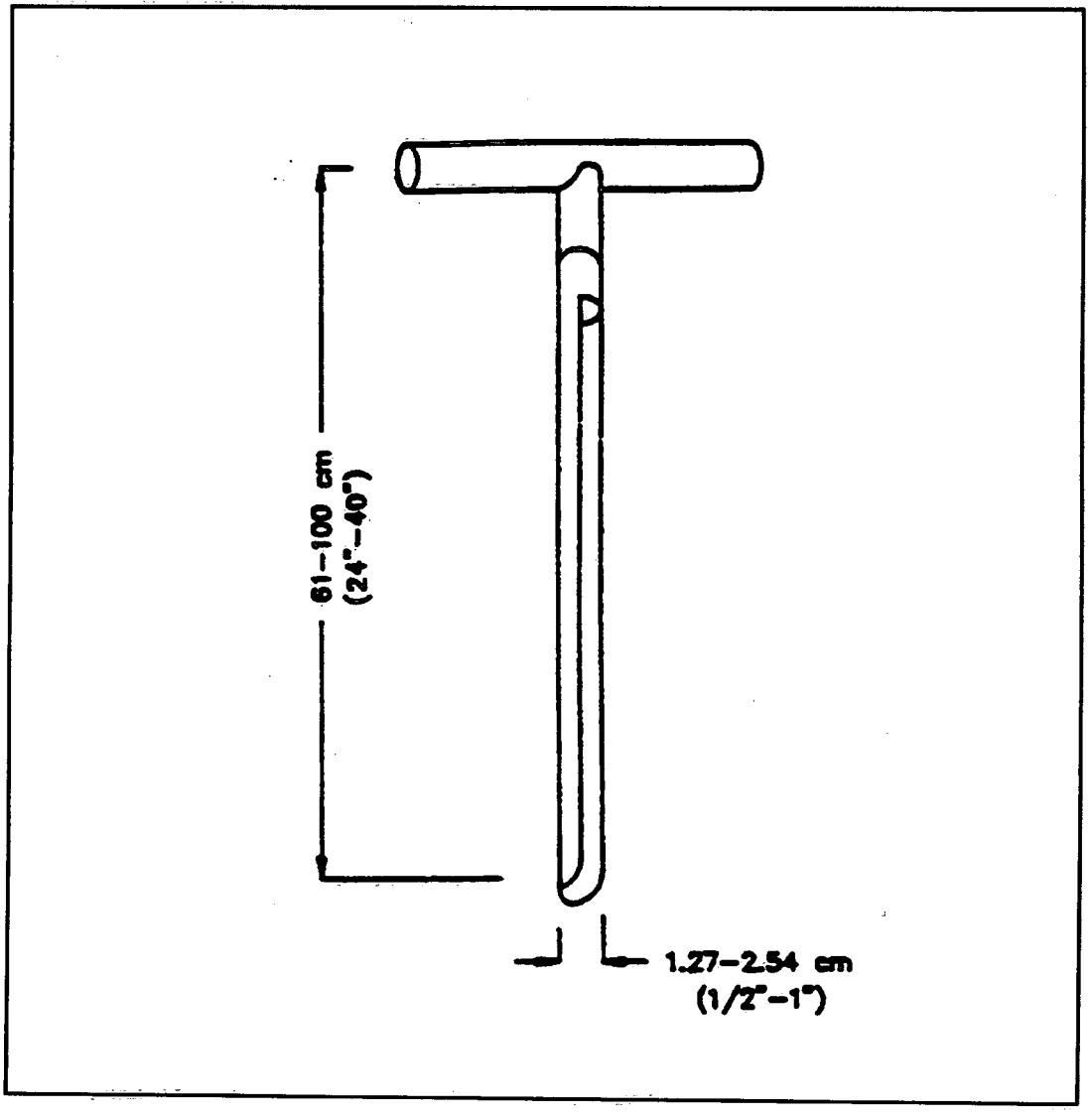


FIGURE 2. Sampling Trier



ATTACHMENT B

NYSDEC Draft DER 10
Technical Guidance for Site Investigation and Remediation,
December 10, 2002

Department of Environmental Conservation

Division of Environmental Remediation

DRAFT DER-10

TECHNICAL GUIDANCE

FOR

SITE INVESTIGATION AND REMEDIATION

December 2002
(12/25/02)

New York State Department of Environmental Conservation
GEORGE E. PATAKI, *Governor* ERIN M. CROTTY, *Commissioner*

DIVISION OF ENVIRONMENTAL REMEDIATION
TECHNICAL GUIDANCE FOR
SITE INVESTIGATION AND REMEDIATION

DIVISION OF ENVIRONMENTAL REMEDIATION TECHNICAL GUIDANCE FOR SITE INVESTIGATION AND REMEDIATION

INTRODUCTION

This section is intended to be used as a "road map" to guide the reader through the technical guidance document, titled *Technical Guidance for Site Investigation and Remediation*, and to provide an overview of the site investigation and remediation process as practiced by the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER). Along the way, specific terms and concepts used by this guidance are defined or introduced in an easy-to-understand, question and answer format.

What is the purpose of this guidance document?

The DER, with assistance from the New York State Department of Health (NYSDOH) and the NYSDEC Division of Fish, Wildlife and Marine Resources, prepared this guidance document to allow anyone seeking to investigate or remediate a potentially contaminated site in New York State to anticipate the basic scope of the work the Department will require. This guidance is intended to facilitate consistent, accurate, efficient and timely completion of remedial projects and contains the minimum technical activities the Department will normally accept for projects where DER oversight, approval or acceptance is sought or mandated by law. DER will, however, determine the acceptable minimum technical activities for a particular site upon consideration of all the facts and circumstances of such site under the authority of applicable laws and regulations. No provision of this guidance document should be construed to limit the DER's authority to require additional investigation and/or remediation based upon site-specific conditions. Sections 1.1 and 1.2 present the scope and applicability of this guidance document in more detail.

No provisions of this guidance, however, should be construed to alter the requirements of the Navigation Law or of the Environmental Conservation Law, or of any regulation or order or permit having the force of law.

Which remedial programs does this guidance apply to?

This guidance is intended to assist the user in developing and implementing investigation and remediation projects under all programs currently administered by the DER involving contaminated sites. These programs and the associated program elements to which this guidance directly applies are summarized in Table 1 below:

Table 1. Remedial programs and existing program elements to which this guidance applies

State Superfund Program	**Environmental Restoration (Brownfield) Program**
• Preliminary Site Assessment • Remedial Investigation • Feasibility Study • Remedial Design • Remedial Action • Operation, Maintenance & Monitoring/Closure	• Site Investigation • Remedial Alternatives Report • Remedial Design • Remedial Action • Operation, Maintenance & Monitoring/Closure
Voluntary Cleanup Program	**State Oil Spill Program**
• Investigation • Remediation	• Spill Investigation • Corrective Action/Spill Cleanup

Does this guidance apply to emergency situations?

This guidance does not replace or supercede protocols established for emergency spill response actions, emergency drum removal actions, and other such events requiring immediate responses and follow-up. In such time- critical situations, existing guidance established pursuant to applicable emergency response laws, regulations and policy, and directives of the on-scene Spill Responder or Project Manager must be followed. It is recommended that applicable sections of this guidance be considered for any spill and, where deemed appropriate and necessary, the Spill Engineer or Project Manager may request that this guidance be used for various elements of such response and follow-up.

Are agreements or oversight documents with the NYSDEC required?

For any site investigation or remediation project for which DER oversight, approval, or acceptance is sought or mandated by law, an oversight document must first be executed with the NYSDEC to address oversight cost reimbursement, liability release, and other issues specific to the site. Work plans are typically part of or are required by the oversight documents and are used to define the scope of a project and the specific work to be performed. The type and form of the oversight document will vary with the program under which the project is being carried out. The types of oversight documents typically utilized by the various remedial programs, pursuant to existing laws, regulations and guidance are identified in Table 2.

Table 2. Oversight documents typically used by various remedial programs

State Superfund	Administrative Order on Consent	• mandatory for responsible party investigation and remediation actions at class 2 sites • common for responsible party actions at class 3 and 4 sites • work plan required as part of oversight document
Brownfield Program	State Assistance Contract	• mandatory agreement between municipality and NYSDEC • work plan required as part of the oversight document
Voluntary Cleanup Program	Voluntary Cleanup Agreement	• mandatory agreement executed between volunteer and NYSDEC • work plan required by the oversight document
Oil Spill Program	Administrative Order on Consent or Stipulation	• mandatory for spill enforcement cases • mandatory for all spill remediations that include discharges to the environment • work plan will be required after the oversight document is executed

Is an oversight document required for closure of Underground Storage Tanks (USTs) ?

Typically, an oversight document executed with the NYSDEC is not required for closure of underground storage tanks (USTs). The wide-spread existence and use of USTs, the common methodologies used for such closures, and closure requirements established by the NYS Chemical and Petroleum Bulk Storage programs allows for this exception. However, the guidance provided in Section 5.5 of this manual should be followed for any UST closures. In instances where UST closure projects present special considerations or require extensive work beyond the tank closure itself, an oversight document and associated work plan may be needed. These situations will be handled on a project specific basis, and prior to undertaking the closure the DER project manager should be consulted.

Can I vary from this technical guidance?

Site-specific circumstances may support changes from the procedures detailed in this guidance. To address these site-specific occurrences, the use of alternate methods can be requested and may be approved when and where appropriate and technically justified. Adequate justification must be provided and prior DER project manager approval must be obtained before using methods which deviate from this guidance. The DER may also require additional work or impose alternate criteria where it determines that the minimum requirements or criteria established by this guidance are not sufficient to fully and adequately complete the project or render the project approvable, pursuant to applicable laws and regulations.

Where can I find general information (Section 1)?

Section 1 of this guidance provides general information and establishes the basic "rules-of-the-game" for utilizing the guidance. Sub-sections of particular note include:

Definitions (Section 1.3) Many of the terms used in this technical guidance document carry specific meanings directly relating to the guidance topic being addressed. It is therefore important that the user carefully review and understand the definitions provided and their appropriate application when undertaking a site investigation or remediation.

Documenting compliance with the technical requirements (Section 1.6) All work conducted pursuant to this technical guidance manual requires proper documentation, as outlined in this sub-section.

Areas of Concern (Section 1.8) In dealing with a potentially contaminated site, efforts are focused on identifying, evaluating and, when appropriate, remediating "areas-of-concern". Discussion and examples of areas-of-concern are provided in this sub-section.

Health & Safety Plan (Section 1.9) All investigative and remedial activities associated with this technical guidance require development and implementation of site-specific health and safety plans as noted in this sub-section.

Interim Remedial Measures (Section 1.11) Interim Remedial Measures are removal, treatment, containment and/or stabilization actions that are designed to prevent contaminant exposure or migration. IRMs can be implemented at any time during a project, do not require detailed investigation or remedy selection and most frequently occur during the investigative phases. Throughout the course of a project, opportunities for contaminant control actions using IRMs should be evaluated and, where appropriate, implemented.

Where can I find information on data quality requirements (Section 2)?

Section 2 describes the minimum quality assurance guidelines and criteria for sampling and laboratory analysis activities. The guidance provided in Section 2 applies to the various sampling and analytical activities associated with the projects or project phases outlined in the subsequent sections of the guidance.

Process Overview

Sections 3 through 6 of the document present technical guidance addressing each of the investigative and remedial steps that should be undertaken at contaminated sites toward fulfillment of the remedial program goals and objectives. The iterative process begins with an assessment of environmental conditions at the site based on the review of existing sources of information and preliminary field investigations (Characterization); progresses through the detailed and focused site investigation (Remedial Investigation); remedy evaluation and design/construction activities (Remedy Selection, Remedial Design/Remedial Action); continues with long term remedial system operation and oversight (Operation, Maintenance & Monitoring) and concludes with site close out (see section 6.7). Table 3 describes the purpose and function of each project phase and Figure 1 depicts the general process from initial characterization through site close out.

Do all of the steps have to be completed before a site or project can be closed out?

Not all projects will require completion of all of the steps depicted in Table 3 and Figure 1. The guidance contained in Sections 3 through 6 is organized in such a way that each section can be used independently or in sequence depending on the intent, scope and complexity of a particular project. This flexibility is reflected in Figure 1 with the indication of "Alternate Project Start" points. For example, if at any point during a site characterization it becomes evident that a remedial investigation is necessary, the project should shift directly to the remedial investigation phase without unnecessarily expending resources to complete the more general assessment provided by a site characterization.

Table 3. Project sequence, purpose and function

Project Phase	Purpose and function	Notes
Site Characterization *Section 3*	• identification of the presence and type of contamination found in various environmental media • determine if applicable standards, criteria and guidance (SCGs) are exceeded • identification of areas of concern • determine if further action is warranted	• utilizes records review, in-field evaluation, sampling and laboratory analysis • typically the first and most common action taken to determine if a site is contaminated
Remedial Investigation *Section 3*	• determination of the nature and extent of contamination for each area of concern • detailed delineation of site environmental media • identification of contaminant sources • identification of contaminant migration pathways • determination of the impact or potential impact of contaminants on public health and the environment • collection of data to facilitate selection and design of remedial actions	• utilizes in-field testing, sampling and laboratory analysis • typically follows the characterization phase if applicable SCGs are exceeded, adverse impacts to fish & wildlife resources, significant health /environmental threat, or contaminants emanate off-site
Remedy Selection *Section 4*	• selection of the most appropriate remedial or cleanup action for a site or area of concern	• includes establishment of remedial action objectives and identification /evaluation of remedial action alternatives • based on the results of the investigation
Remedial Design /Remedial Action *Section 5*	• design and implementation of the selected remedy	• includes preparation of design documents • includes construction /installation of remedial systems • includes implementation of institutional controls, where applicable
Operation, Maintenance & Monitoring *Section 6*	• long-term operation, maintenance and monitoring to ensure acceptable remedy effectiveness	• includes site close out when remedial action objectives are met

What is the minimum level of investigation that may be necessary at a site (Section 3)?

Section 3 provides guidance on the two basic investigative phases used to address a potentially contaminated site or area of concern: 1) site characterization and, 2) remedial investigation. The two phases are closely related,

differing mainly in level of effort and focus. The Site Characterization level of effort will typically be applicable to suspected hazardous waste and hazardous substance disposal sites which have had little or no prior investigation. It may also be the only investigative phase necessary at some smaller sites where contamination is limited to specific areas of concerns, such as tanks or other process-related structures, or where contamination does not extend beyond the site boundaries. It is anticipated that the Site Characterization level of effort may be applicable to some of the spill sites, voluntary cleanup and brownfield sites which are investigated pursuant to this guidance. Typically, once a problem impacts off-site areas or becomes more complex due to the nature and extent of the contamination, the Remedial Investigation level of effort becomes appropriate.

Site Characterization: Site characterization, typically the initial assessment of a site, is performed in order to identify the presence and type of contamination found in various environmental media. Typically, the site characterization consists of both a records search, to identify potential areas of concern, and a field investigation, to inspect and sample those areas of concern. The records search is intended to gather information on past site uses and disposal activities that, in turn, aids in the formulation of field characterization activities. Site inspection, in-field testing and environmental media sampling are then conducted to provide sufficient data to characterize the site relative to contamination. Data gathered during the site characterization is used to determine if a remedial investigation is needed (refer to Figure 1) or if no further investigation or remediation is required for the site.

Remedial Investigation: The remedial investigation phase is a detailed and focused continuation of the site characterization. The remedial investigation should fully delineate the nature and extent of site contaminants, site environmental media, source(s) of contamination, and pathways for contaminant migration. Data collected during the remedial investigation is used to evaluate threats to public health and the environment and, when necessary, to conduct a detailed ecological impact analysis. Sufficient data and site knowledge must be generated through the remedial investigation to allow for effective identification and evaluation of remedial action alternatives and to facilitate remedy selection.

How are the different investigative and remedial phases related across each of the various programs administered by DER?

The various remedial programs to which this guidance applies refer to project elements in different ways. Although these names or references may differ somewhat from program to program, their corresponding purpose and function are essentially the same. Table 4 provides a cross-reference between the names used by the Technical Guidance for the various program elements involved in the investigation and/or remediation of a site, and those currently in use by the different DER programs which will be utilizing the Technical Guidance.

What factors are considered when selecting a site remedy (Section 4)?

Determining what action or remedy is necessary to address site contamination is a step-by-step process through which a broad array of potential response options is identified and then narrowed, according to statutory and regulatory criteria as well as guidance, to the point that an appropriate remedy can be selected. Section 4 addresses the remedy selection process. The basic process consists of establishing remedial action objectives, identifying general response actions, screening and evaluating applicable technologies, and finally selecting the most appropriate remedial action. The factors considered by DER when selecting a remedy are described in section 4, and include:

- compliance with Standards, Criteria and Guidance (SCGs)
- overall protectiveness of public health and the environment
- short-term and long-term effectiveness
- reduction of toxicity, mobility, and volume
- implementability
- cost effectiveness
- community acceptance

Note: for the convenience of the regulated community, the above criteria are set out utilizing the format of 40 CFR §300.40 and cross references to the comparable criteria at 6 NYCRR § 375-1.10 are provided in section 4.1 (d).

Table 4. Remedial program element cross-reference		
Technical Guidance remedial program element name	Existing remedial program element name	
Site Characterization *Section 3*	Preliminary Site Assessment	State Superfund
	Site Investigation	Brownfields
	Investigation	Voluntary Cleanup
	Spill Investigation	Oil Spill
Remedial Investigation *Section 3*	Remedial Investigation	State Superfund
	Site Investigation	Brownfields
	Investigation	Voluntary Cleanup
	Spill Investigation	Oil Spill
Remedy Selection *Section 4*	Feasibility Study	State Superfund
	Remedial Alternatives Analysis	Brownfields
	Remedial Action Selection	Voluntary Cleanup
	Remedial Action Selection	Oil Spill
Remedial Design/ Remedial Action *Section 5*	Remedial Design/Remedial Action	State Superfund
	Remedial Design/Remedial Action	Brownfields
	Remediation	Voluntary Cleanup
	Corrective Action	Oil Spill
Operation, Maintenance & Monitoring *Section 6*	Operation, Maintenance & Monitoring /Site Close out	All Programs

How are selected remedies implemented (Section 5)?

Section 5 provides for implementing a remedy after it has been approved by the DER. Remedy implementation typically includes a remedial design phase, detailing and planning the work to be conducted, followed by a remedial action phase wherein actual installation and/or construction takes place.

Remedial Design: The remedial design establishes the size, scope and character of the remediation planned for a site. The level of detail and form of the remedial design will depend on the remedial program under which the design is being carried out, mandates of the oversight document, and complexity of the remedial project to be implemented. The remedial design may be documented in a remedial design/remedial action work plan which describes the construction and installation activities to be undertaken including project schedules, applicable community and worker health and safety plans, confirmatory sampling plans, and site restoration plans. The remedial design must be completed by a professional engineer licensed to practice in New York State and may not be implemented unless it is approved by the DER.

Remedial Action: The remedial action phase of a project is simply the implementation of the selected remedy based on the remedial design. This project phase involves site construction activities, monitoring systems installation and/or implementation of institutional controls. Where required by State law, or if mandated by the oversight document, certification of the remedial design and/or remedial action by a professional engineer licensed to practice in New York State must be provided.

How do I evaluate the effectiveness of a remedy (Section 6)?

Section 6 provides guidance on the minimum operation, maintenance and monitoring (OM&M) activities that may be found acceptable to the DER. Operation, maintenance and monitoring of remedial actions and remedial systems is performed to ensure that the remedy is being properly operated, evaluate the performance of a remedial action and ensure its effectiveness over time. OM&M activities continue until the remedial action objectives for the site have been achieved.

For remedial projects that require OM&M for less than 18 months, equipment specifications, operation and maintenance procedures should be maintained by the site operator/owner. Remedial projects for which OM&M will last longer than 18 months trigger the preparation and use of an OM&M manual. The manual is to delineate and detail all OM&M requirements and procedures to be followed to ensure remedy effectiveness. The OM&M manual is a dynamic document that is updated as necessary to reflect changes in site conditions or the manner in which the remedy is operated and/or maintained. Where required by the oversight document, OM&M manuals must be approved by the DER.

What standards, criteria, and guidance apply to my project (Section 7)?

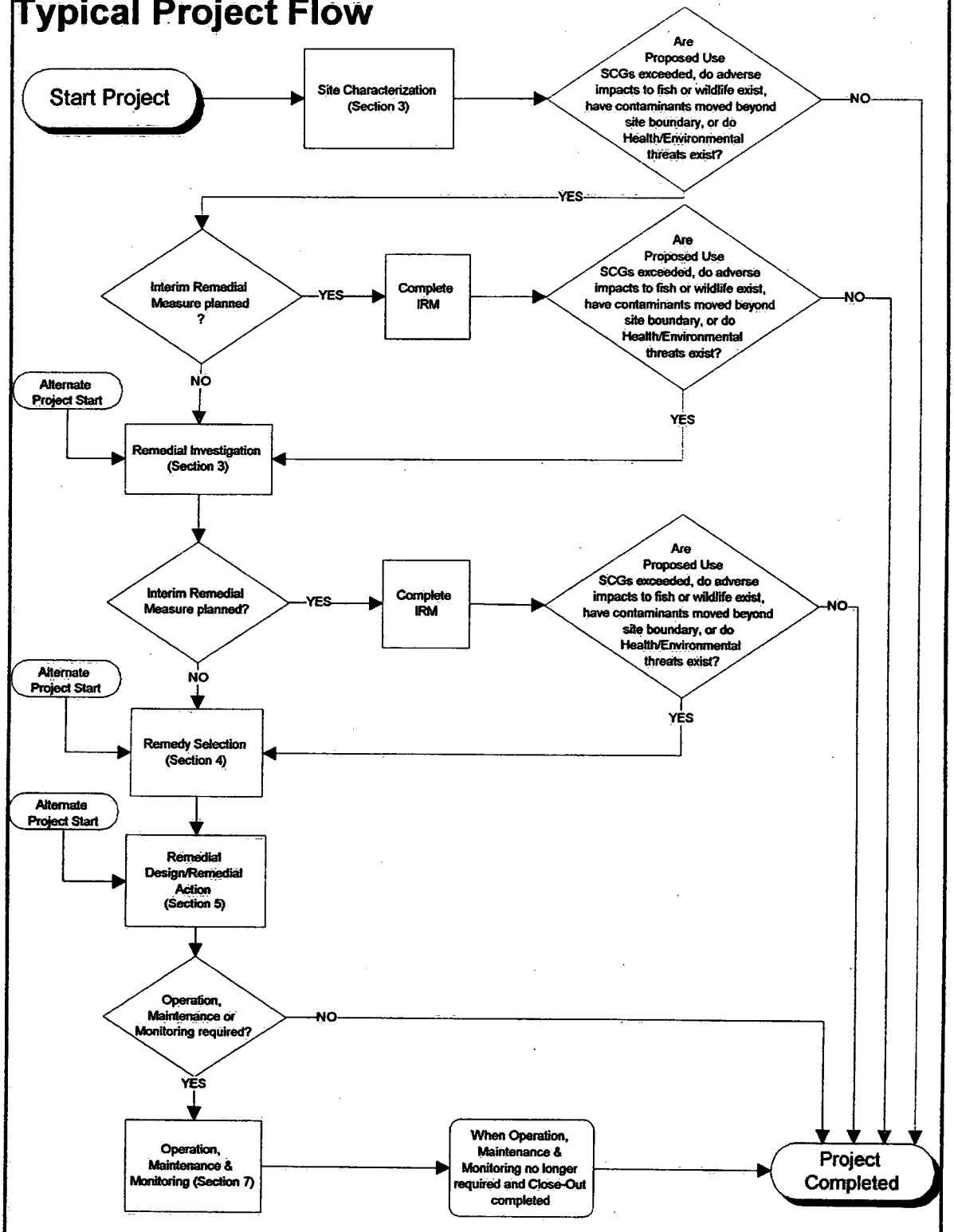
Section 7 contains a listing of SCGs, that are utilized when applicable, for each phase of contaminated site investigation and remediation discussed in this technical guidance manual. However, projects conducted pursuant to this guidance document must utilize and comply with all applicable SCGs. While the State and Federal SCGs listed in Section 7 reflect those typically utilized in New York State when conducting contaminated site investigations and remediations, the list is not necessarily all inclusive.

How can I obtain more information?

While this technical guidance manual is designed to be comprehensive, questions regarding its contents will arise. The user is encouraged to contact the DER project manager assigned to the project, whenever necessary to ensure proper use and application of this guidance.

Figure 1

Typical Project Flow



NOTES: * Results of the Site Characterization phase may allow for Remedy Selection, Remedial Design/Remedial Action or Operation, Maintenance & Monitoring without first completing Remedial Investigation.
* IRMs can be undertaken at any time during a project. IRM decision points on this diagram are illustrative only

DIVISION OF ENVIRONMENTAL REMEDIATION
TECHNICAL GUIDANCE FOR
SITE INVESTIGATION AND REMEDIATION

SECTION 1. GENERAL INFORMATION

1.1 Scope

(a) This document presents guidance as to the minimum technical activities to be performed to investigate and remediate contamination at any site that is administered by the DER. However, the DER determines the acceptable minimum technical activities for a particular site upon consideration of all the facts and circumstances of such site under the authority of applicable laws and regulations. No provision of this guidance document should be construed to limit the DER's authority to require additional investigation and/or remediation based upon site-specific conditions. Sections 1.1 and 1.2 below, present the scope and applicability of this guidance document in more detail.

(b) Adherence to this guidance does not relieve any person from:

1. Complying with more stringent requirements or provisions imposed by any other federal, state or local applicable statutes or regulations; and

2. Obtaining any and all permits required by state, federal or local statute or regulation, except for environmental permits issued by the Department, as expressly provided in section 7.3 of this document.

(c) This guidance document does not apply to emergency interim remedial measures, which are described in section 1.11.

(d) No provisions of this guidance should be construed to alter the requirements of Navigation Law or of Environmental Conservation Law, or of any regulation or order or permit having the force of law.

1.2 Applicability

(a) This document describes the minimum technical guidance which forms the basis of the DER review of the investigation and/or remediation of any contaminated site in New York, including, without limitation, those sites and activities subject to:

1. The New York State Inactive Hazardous Waste Disposal Site Remedial (State Superfund) Program, as defined by Environmental Conservation Law, Article 27, Title 13;

2. The New York State Environmental Restoration (Brownfield) Program, as defined by Environmental Conservation Law, Article 56, Title 5;

3. The New York State Voluntary Cleanup Program;

4. The New York State Oil Spill Program, as defined by Navigation Law, Article12, Title 176;

5. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by Superfund Amendments and Reauthorization Act of 1986 (Federal Superfund) Program (CERCLA) and;

(b) Any person seeking DER review of work undertaken pursuant to this guidance will:

1. Execute an oversight document with the DER, as defined below:

i. For the State Superfund program an Administrative Consent Order will be negotiated or an Order issued by the Commissioner pursuant to ECL §27-1313. 3. a.

ii. For the Brownfield Program, after approval of an application by the Department, a State Assistance Contract will be executed by the municipality proposing the project and the Department, pursuant to ECL §56-0503.

iii. For the Voluntary Cleanup program, after approval of an application, a voluntary cleanup agreement will be executed by the volunteer and the Department.

iv. For the Oil Spill Program, an order on consent or stipulation pursuant to Article 12 of the Navigation Law will be executed.

(1) Underground storage tank closures performed pursuant to section 5.5 are exempt from this requirement.

(2) For oil spill cleanups performed under the voluntary cleanup program, the provisions of (b) 1. iii. above, will apply.

v. For Federal Superfund sites, federal consent decrees, administrative orders on consent or unilateral orders issued pursuant to CERCLA.

2. For any of the programs identified in (b) 1. above, another form of oversight document from that identified may be utilized, on a case-by-case basis, if determined appropriate by the DER and the Division of Environmental Enforcement and agreed to by the person responsible for conducting the investigation and/or remediation.

(c) This guidance will be applied as follows:

1. For any site at which a particular phase of investigation and/or remediation was commenced prior to the date of this guidance being available, the DER will evaluate such work to determine whether the work is in substantial compliance with this guidance and therefore acceptable to the DER.

2. This guidance will be utilized by the DER in the review and approval of any work conducted after the date of this guidance being issued as a final document, except for work which is conducted pursuant to workplans which were submitted to the DER prior to the operative date and initiated within six months of DER approval of the workplan.

1.3 Definitions

(a) In addition to these definitions of words and terms used in this guidance, a glossary of terms specific to quality assurance and analytical methods is included in section 2.3 and acronyms for the various rules and regulations cited are included in section 7.2 of this guidance, as well as on the DER web site (www.dec.state.ny.us/website/der/index.html).

(b) The following words and terms, when used in this guidance, will have the following meanings unless the context clearly indicates otherwise:

"Active groundwater remediation" means any form of groundwater remediation which requires physical action to alter the condition of the impacted aquifer for the purposes of achieving applicable standards, criteria or guidance (SCGs). Active groundwater remediation includes, but is not limited to, pumping that consistently depresses the water table over an areal extent, air sparging, bailing, skimming, in-well air stripping and bioremediation involving the addition of nutrients and/or organisms below the water table.

"Area of concern" means any existing or former location where contaminants are or were known or suspected to have been discharged, generated, manufactured, refined, transported, stored, handled, treated, disposed, or where

hazardous substances, hazardous wastes, or petroleum products have or may have migrated. See section 1.8.

"Background groundwater contamination" means concentrations of contaminants in groundwater that originated from either natural sources (that is, non-man-made) or upgradient, off-site discharges (that is, man-made, non-site-related discharges). Background groundwater contamination may include, but is not limited to, the same contaminants present both on the site and off the site at upgradient locations, or parent contaminants detected off the site at upgradient locations and daughter products of these parent contaminants detected on the site.

"Background soil level" means the chemical concentration of a contaminant which is found in soil which is not attributable to present or prior activities at the site in question.

"Biota" means the plant and animal life associated with the site or impacted by the site.

"CERCLA" means the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by Superfund Amendments and Reauthorization Act of 1986 (42 U.S.C. 9601 et seq.).

"Commissioner" means the Commissioner of the Department of Environmental Conservation or his/her authorized representative.

"Contaminants of ecological concern" means site contaminants that meet any of the following:

a) exceed the NYSDEC Technical Guidance for Screening Contaminated Sediments;

b) exceed the NYSDEC surface water criteria in the NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 for type A(A), A(C), H(FC) or W waters;

c) are known to bioaccumulate or biomagnify in the aquatic, marine or terrestrial food chain;

d) exist at levels which result in toxic effects in biota;

e) may contribute to the need for a health advisory for the consumption of fish or wildlife.

"Contamination" or "contaminant" means any discharged hazardous substance as defined pursuant to ECL § 37-0103, hazardous waste as defined pursuant to 6 NYCRR Part 371, or petroleum as defined pursuant to ECL § 17-1003.

"Department" or "NYSDEC" means the New York State Department of Environmental Conservation.

"DER" means the Division of Environmental Remediation

"Diligent inquiry" means:

1. Conducting a diligent search of all documents which are reasonably likely to contain information related to the object of the inquiry, which documents are in such person's possession, custody or control, or in the possession, custody or control of any other person from whom the person conducting the search has a legal right or ability to obtain such documents. The minimum third parties that are to be contacted for records in a due diligence search, include State, county and local government offices, including fire departments, ambulance and hospital records offices, police records offices, and the governmental departments of sanitation and health; and

2. Making reasonable inquiries of current and former employees and agents whose duties include or included any responsibility for hazardous substances, hazardous wastes or petroleum, and any other current and former employees or agents who may have knowledge or documents relevant to the inquiry.

"Discharge" means any intentional or unintentional action or omission resulting in the releasing, spilling, leaking, pumping, pouring, emitting, emptying or dumping of a contaminant into the waters or groundwater of the State or onto the lands or onto lands from which it might flow or drain into said waters, or into the waters outside the jurisdiction of the State when damage may result to the lands, waters, or natural resources within the jurisdiction of the State, except discharges pursuant to and in compliance with the conditions of a valid State or Federal permit, or a discharge exempted form a permit in accordance with section 7.10 of this guidance.

"Disposal" means the abandonment, discharge, deposit, injection, dumping, spilling, leaking or placing of any substance so that such substance or any related constituent thereof may enter the environment.

"DNAPL" or a " Dense Non-Aqueous Phase Liquid" means a non-aqueous phase or immiscible liquid which remains as a separate phase or layer and has a specific gravity greater than water. A DNAPL has the potential to sink through a formation until it pools on a confining unit or is immobilized as a residual. Unlike LNAPLS, DNAPLS may flow down the slope of the aquifer bottom independent of the direction of the hydraulic gradient.

"ECL" means the New York State Environmental Conservation Law, Chapter 43-B of the Consolidated Laws of New York.

"Emergency response action" or "Emergency IRM" means an action taken in response to a situation which requires immediate containment and/or remedial actions to ensure that a release or potential release does not threaten the immediate health and safety of humans and/or the environment.

"Endangered species, threatened species and species of special concern" means those species listed by the Department as provided in 6NYCRR Part 182.

"Engineering controls" means any physical barrier or passive mechanism to contain or stabilize contamination, ensure the effectiveness of a remedial action or eliminate potential exposure pathways from any contaminated medium. Engineering controls may include, without limitation, caps, covers, vapor barriers, fences, slurry walls, access controls and demarcation barriers (e.g. geonets or other fabric). Engineering controls are used in conjunction with institutional controls, to ensure that the engineering controls remain effective.

"Environment" means any water including surface or subsurface, water vapor, any land including land surface or subsurface, air, fish, wildlife, biota including humans, and all other natural resources.

"Exposure assessment" involves specifying the population that might be exposed to the agent of concern, identifying the routes through which exposure can occur and estimating the magnitude, duration and timing of the exposure that people or biota might receive from a source

"Exposure pathway" means the route through which a human or biota may come into contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

"Fish and wildlife resources" means biota and the habitats (natural or man-made) which support them.

"Free product" means an immiscible or non-aqueous phase liquid (NAPL) existing at the surface or in the subsurface in a potentially mobile state.

"Grossly contaminated soil" means soil which contains visibly identifiable free or otherwise readily detectable free or residual product

"Groundwater" means water below the land surface in a saturated zone of soil or rock. This includes perched water separated from the main body of groundwater by an unsaturated zone.

"Hazardous substance" means any substance listed as a hazardous or acutely hazardous substance in 6 NYCRR Part 597, or a mixture thereof.

"Hazardous waste" means a waste which appears on the list or satisfies the characteristics in 6 NYCRR Part 371.

"Historic fill material" means non-indigenous material, deposited or disposed of to raise the topographic elevation of the site, which was contaminated prior to emplacement, and is in no way connected with the subsequent

operations at the location of emplacement and which includes, without limitation, construction debris, dredge spoils, incinerator residue, demolition debris, fly ash, and non-hazardous solid waste. Historic fill material does not include any material which is chemical production waste or waste from processing of metal or mineral ores, residues, slag or tailings. In addition, historic fill material does not include a municipal solid waste disposal site.

"Injury"means an observable (i.e. qualitative) or measurable (i.e. quantitative) adverse change in a natural resource or any impairment of a human or ecological service provided by that resource relative to baseline, reference, or control conditions.

"Interim Remedial Measure" or "IRM" means a discrete set of activities to address both emergency and non-emergency site conditions, which can be undertaken without extensive investigation and evaluation, to prevent, mitigate, or remedy human exposure and/or environmental damage or the consequences of human exposure and/or environmental damage attributable to a site.

"Institutional controls" means non-physical mechanisms which restrict the use of a site, limit human exposure, prevent any actions which would threaten the effectiveness or operation and maintenance of a remedy at or pertaining to the site. Institutional controls apply when contaminants remain at a site at levels above the SCGs which would allow unrestricted human use of the property. Institutional controls may include, without limitation, restrictions on the use of structures, land and groundwater as well as deed notices and covenants.

"LNAPL" or "Light Non-aqueous Phase Liquid" means a non-aqueous phase or immiscible liquid which remains as a separate phase or layer and has a specific gravity less than water. Because LNAPLs are less dense than water, they tend to float on top of the water table and are also commonly referred to as a floating product.

"Long term spill remediation" means those oil spill remediations where off-site impacts have,or will, represent an immediate threat of contamination to public water supply systems.

"Monitored natural attenuation" or "MNA" is the process by which a natural systems ability to attenuate contaminant(s) at a specific site is confirmed, monitored and quantified. Contaminant concentrations may attenuate in natural systems through biodegradation; sorption; volatilization; radioactive decay; chemical or biological stabilization; transformation; dispersion; dilution; or the destruction of contaminants.

"NAPL" or "Non-Aqueous Phase Liquid" means an immiscible liquid which remains as a separate phase or layer in the environment.

"Natural resource damages" means the amount of money calculated to compensate for injury to, destruction of, loss of or loss of use of natural resources, including the reasonable costs of assessing or determining the damage, which shall be recoverable by New York State, where natural resources are land, fish, wildlife, biota, air, water, groundwater, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the State.

"Non-emergency IRM" means an IRM which is not in response to an immediate threat to human health and/or the environment undertaken at a site being addressed under the superfund, brownfields or voluntary cleanup programs.

"NYSDOH" means the New York State Department of Health

"Oversight document" means any document the NYSDEC issues pursuant to section 1.2 (b) of this guidance to define the role of a person participating in the investigation and/or remediation of a site or area(s) of concern.

"Person responsible for conducting the investigation and/or remediation" or "Person responsible for conducting the investigation" or "Person responsible for conducting the remediation" means any person who executes or is otherwise subject to an oversight document, and any person who is performing the investigation and/or remediation or has control over the person (for example, contractor or consultant) who is performing the investigation and/or remediation, including, without limitation, an owner or operator. This also includes the DER

for state funded investigation and remediation activities.

"Petroleum" or "Oil" is defined by Article 12 Section 172 of the NYS Navigation Law as oil or petroleum of any kind and in any form including but not limited to, oil, petroleum, fuel oil, oil sludge, oil refuse, oil mixed with other wastes and crude oils, gasoline and kerosene. For purposes of this guidance, oil include mineral oils or any other oil for which an investigation and/or remediation is determined necessary by the DER, to address a spill discharge or any disposal impacting public health or the environment.

"Plume management monitoring" is the process by which a dissolved plume, which has yet to reach equilibrium with the processes of natural attenuation, is monitored to ensure that it does not cause an unacceptable impact.

"Presumptive remedy" means technologies appropriate for the remediation of common categories of sites, based on historical patterns of remedy selection and EPA/NYSDEC's scientific and engineering evaluation of performance data. Presumptive remedies can be used to accelerate the remedial selection process.

"Project Manager" means the NYSDEC staff member with primary responsibility for ensuring that an investigation or remediation was completed in accordance with this guidance.

"RCRA" means the Resource, Conservation and Recovery Act of 1976.

"Receptor" means any humans or biota which are, or may be expected to be, or have been, exposed to or affected by a contaminant from a site.

"Regulated wetland" means any tidal or freshwater wetland regulated by New York State under ECL Articles 15, 24 and 25 and as defined in 6NYCRR Part 608.5, 661.4 hh and 663.2(p).

"Remedial action" means those actions taken at or near a site as may be required by the DER, including, without limitation, removal, treatment, containment, transportation, securing, or other engineering or institutional controls, whether of a permanent nature or otherwise, designed to ensure that any discharged contaminant is remediated in compliance with the applicable SCGs pursuant to Section 5 of this document.

"Remedial action costs" means all costs associated with the development and implementation of a remedial action including all direct and indirect capital costs, engineering costs, and annual operation, maintenance and monitoring costs. Such costs, when applicable, should include, without limitation, costs for construction of all facilities and process equipment, labor, materials, construction equipment and services, land purchase, land preparation/ development, relocation expenses, systems start up and testing, facility operation, maintenance and repair, continuous effectiveness monitoring, periodic site condition reviews and legal, administrative and capital costs associated with the placement of institutional controls on a property. Remedial action costs should be expressed as net present worth of all such costs over time by discounting all future costs to the current calendar year. The discount rate to be used for all present worth analyses should be current rate as specified by the DER at the time of remedial action selection and should be applied before taxes and after inflation. The period of performance for present worth costing analyses should not exceed 30 years. The 30 year period is intended to allow consistent evaluation of costs only, and does not imply that the operation, maintenance and monitoring of a remedy will end after 30 years.

"Remedial investigation" means actions to investigate contamination and determine the nature and extent of the contamination presented by a discharge or disposal at a site. The requirements of a remedial investigation are set forth at section 3 of this document.

"Remediation" or "remediate" means all necessary actions to cleanup any known, suspected, or threatened discharge or disposal of contaminants, including, as necessary, the remedial selection, remedial design, remedial action and operation , maintenance and monitoring of the remedy.

"Residual product" means an immiscible liquid (NAPL) existing in the subsurface at concentrations below the

residual saturation point, which is held in place by capillary forces and will therefore not drain from the formation.

"Risk assessment" is the characterization of the potential adverse health effects of human exposure to environmental hazards. It includes several steps: describing the potential adverse health effects based on an evaluation of epidemiological, clinical toxicological and environmental research; extrapolating from those results to predict the type and estimate the extent of health effects in humans under given conditions of exposure; making judgement as to the number and characteristics os the persons exposed at various intensities and durations and ultimately judging whether there is a risk to public health and what the over all magnitude of the risk is.

"Sediment" means soils or organic material in water, as found in lakes, rivers, streams and other water bodies and in, or in close proximity to, wetland areas. Material found in enclosed sumps, sewers or piping systems not accessible to fish and wildlife and not forming any benthic or aquatic habitat are not considered sediments for the purpose of comparison to the NYSDEC Technical Guidance for Screening Contaminated Sediment.

"Significant coastal fish and wildlife habitat" means such habitat designated by New York State under Article 42 of the Executive Law and regulated under 19 NYCRR Part 602.5(a).

"Significant habitat" means any significant habitat or ecological communities designated by the New York State Natural Heritage Program.

"Site" means a confirmed or suspected inactive hazardous waste disposal site, a chemical or petroleum spill site, a hazardous substance disposal site, a site being addressed under the NYS brownfields program, or a property being investigated under the NYS voluntary cleanup program. The site may be a specific area of a parcel or may extend beyond a parcels boundaries.

"Site characterization" means the first phase in the process of identifying areas of concern at a site, which is conducted pursuant to section 3.

"Standards, Criteria and Guidance" or " SCGs" means promulgated requirements ("standards" and "criteria") and non-promulgated guidance ("guidance") which govern activities that may affect the environment and are used by the DER at various stages in the investigation and remediation of a site. SCGs incorporate both the CERCLA concept of "applicable or relevant and appropriate requirements" (ARARs) and EPA's "to be considered" (TBCs) category of non-enforceable criteria or guidance. The most common SCGs, which are applicable to the actions described in this document, are identified in section 7.

"Substantive technical permit requirements" means those requirements that have a direct bearing on the action to be taken, and relate to the technical (scientific) aspects of the action rather than the administrative procedures of obtaining a permit. Also see section 7.3.

"Surface soil sample" means a representative sample of the unconsolidated mineral and organic matter collected from a site: to a depth of two inches below ground surface excluding vegetative cover, for evaluating public health exposure; or, to a depth of six inches below ground surface for garden soils or a fish and wildlife resources impact analysis..

"Toxicity assessment" is a field study, laboratory study and/or literature review conducted to determine the concentration at which a contaminant becomes toxic to an individual or an organism. A contaminant is considered toxic if it causes death, morbidity or sub-lethal effects on growth, reproduction, behavior or physiology of an organism, whether through direct or indirect toxicity or through bioaccumulation.

"Underground storage tank" means any tank or other vessel which is completely covered with earth or other backfill substance. Tanks in subterranean vaults accessible for inspections are not considered underground storage tanks.

"Unrestricted use SCG" means a contaminant level which, when achieved, restores the contaminated media to a condition or quality suitable for any human use.

"Waters" means all lakes, bays, sounds, ponds, impounding reservoirs, groundwater, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic Ocean within the territorial limits of the State of New York, and all other bodies of water, natural or artificial, inland or coastal, fresh or salt, public or private, which are wholly or partially within or bordering the State or within its jurisdiction.

"Wetland" means any freshwater or tidal wetland including Federal jurisdictional wetlands, NYS regulated wetlands and unregulated wetlands.

"Wild, scenic or recreational river" means any river designated under ECL Article 15 and regulated under 6NYCRR Part 666.4.

1.4 Notification

(a) The person responsible for conducting the investigation and/or remediation, unless otherwise specified, should notify the following persons in writing, including the information identified in (c) below:

1. The DER at least five (5) business days prior to the initiation of any field activities at an applicable site, as per section 1.2 (a).

2. A written notice should be sent to the adjacent property owners for the site and other impacted or interested members of the public as well as to municipal officials of the municipality in which the site is located, if the site is subject to this guidance. This notice will be sent prior to the issuance of the decision document(s) prepared pursuant to section 4.4 of this document.

3. Additional notices required by the applicable programs identified in section 1.2.

(b) The notifications pursuant to (a) above are not intended to satisfy the public participation requirements applicable to sites being investigated or remediated pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. 9601 et seq. and the National Contingency Plan, 40 CFR Part 300 or the provisions of section 1.10 of this guidance.

(c) The notifications pursuant to (a) above should be in writing and should include the following information:

1. The name and address of the person responsible for implementing the remedial action or emergency response action;

2. The name of the site;

3. The valid Department site identification number or an United States Environmental Protection Agency (EPA) site identification number, if applicable.

4. The street address of the site;

5. The lot and block of the site, if readily available;

6. A brief description of the current use and occupancy of the site.

7. The nature of the sampling activities or remedial action to be performed;

8. The anticipated start date of the sampling activities or remedial action;

9. The location of the site in a GIS-compatible format (that is, latitude and longitude or State Plane Coordinates) if available; and

(d) The information required to be sent to the DER pursuant to (a) above should be submitted to the assigned project manager, to the applicable regional spill engineer for a petroleum only spill, or, if no project manager has been assigned, to the following address:

NYSDEC
Division of Environmental Remediation
Bureau of Hazardous Site Control

(e) The person responsible for conducting the investigation and/or remediation should notify the DER pursuant to this subsection if that person determined that contamination migrated onto its site from another site. The person responsible for conducting the investigation and/or remediation should notify its assigned DER project manager, or if they are not assigned a project manager, the DER spill hotline at 1-800-457-7362.

(f) No provisions of this guidance should be construed to alter the notification requirements of Navigation Law § 175 or of Environmental Conservation Law §§ 17-1007, 17-1743, 40-0111, or of any regulation or order or permit having the force of law.

1.5 Certifications

(a) The documents identified below, which are prepared in final form in accordance with this guidance for submission to the DER, should be stamped and signed by a professional engineer licensed, or otherwise authorized, to practice in New York State, in accordance with Education Law Section 7200 et seq.. The documents for which this certification is required are:

1. All remedy selection reports prepared pursuant to section 4.3;

2. Any remedial design or remedial design work plan prepared pursuant to sections 5.2 or 5.3;

3. All remedial action reports and as built drawings prepared pursuant to section 5.7.;

4. Any interim remedial action (IRM) design or a IRM design work plan for a remedial treatment system, prepared pursuant to sections 5.2 or 5.3;

5. Any IRM remedial action report prepared pursuant to section 5.7.;

6. Underground storage tank closure reports, as stated in section 5.5 (a) 2., for the closure of underground storage tanks which are not performed pursuant to section 5.5,

7. Underground storage tank waiver of sampling requirements certification pursuant to section 5.5 (b) 6.

8. Certifications that engineering controls are in place and remain effective pursuant to sections 6.3(b)(4) and 6.4.

9. Operation, maintenance and monitoring reports required pursuant to section 6.3 (c) 3.

(b) All health and safety plans submitted in response to section 1.9 should be prepared, signed and implemented by a certified industrial hygienist, or other appropriate individual pursuant to 29 CFR1910.120.

(c) Any Fish and Wildlife Resources Impact Analysis submitted under section 3.10 and/or 4.7. should document the education and experience of the biologist, ecologist or other qualified professional conducting the FWRIA.

(d) Any tank closure report submitted to the DER in accordance with section 5.5 or operation, maintenance and monitoring report, in accordance with section 6.4 (d) 3 iv., will be prepared and certified by a professional who has knowledge of the physical sciences, technology or the principles of engineering acquired by education and practical experience related to tank closures and any necessary subsequent investigation.

1.6 Documenting compliance with the technical guidance

(a) All work being conducted at a site in accordance with this guidance, whether or not being done with DER oversight pursuant to 1.2 (b), should be documented and included in reports which follow the format and contain the information described in the reporting sections of 2 through 6 of this guidance and be certified as defined by section 1.5. If a report has already been submitted to the Department pursuant to another Department regulatory program then the previously submitted report may be submitted. Any reports prepared in accordance with this guidance may be combined into a single report.

(b) When the investigation and/or remediation is conducted with DER oversight pursuant to 1.2 (b), the person responsible for conducting the investigation and/or remediation should submit workplans, if applicable, and reports pursuant to the schedule contained in the oversight document which the person executed with the DER. The workplan and/or report should comply with the format and contain the information described in sections 2 through 6 of this document.

(c) In order to provide flexibility in the technical guidance for investigation and remediation described in this document, the DER has identified certain limited situations, as specified throughout this guidance, when alternate sampling, analytical, or investigatory methods may be used without DER pre-approval.

1. Alternate methods may be used if the person responsible for conducting the investigation and/or remediation documents in the applicable remedial phase report (that is, site characterization, remedial investigation, remedial action, monitoring) a rationale acceptable to the DER for using the alternate method;

2. The DER will review the documentation as part of the DER's oversight during the investigation and/or remediation; and

3. The DER will evaluate the alternate method in terms of its site-specific application, based upon the documentation provided and other appropriate information available to the DER, in terms of the extent to which the alternate method:

i. Has previously been used successfully or approved by the DER in writing in other similar situations;

ii. Reflects current technology as documented in peer-reviewed professional journals;

iii. Provides results which are verifiable and reproducible;

iv. Can be expected to achieve the same results or objectives as the method which it proposes to replace;

v. Furthers the attainment of the goals of the specific remedial phase for which it is used; and

vi. Is consistent with the intent of this guidance to ensure the investigation and/or remediation of contaminated sites is conducted in a manner which is protective of public health and the environment.

(d) Any person responsible for conducting the investigation and/or remediation may propose to the DER alternate methods from any of the requirements in sections 2 through 6 and document their request as detailed in (d)1and (d)2, below. The request should identify an alternate approach to be utilized in place of the guidance provided and is not effective until it has been approved by the DER. The decision as to whether or not to grant the request rests solely with the DER.

1. To propose alternative methods from the guidance in sections 2 through 6, the person responsible for conducting the investigation and/or remediation should submit the following information to the DER at the address in the applicable oversight document prior to the utilization of the alternate approach:

i. The site name and Department site identification number, if assigned;

ii. The name and address of the person submitting the request;

iii. The name and address of the person conducting the investigation and/or remediation;

iv. The names and addresses of the owner(s) and occupant(s) of the site which is the subject of the request;

v. The street address and all tax block and lot numbers of the site which is the subject of the request;

vi. A description of the proposed alternate approach and applicable citation from this document, if applicable;

vii. A description of site specific conditions applicable to the request;

viii. The technical basis for the request pursuant this document; and

ix. Any other information or data the DER requests to thoroughly evaluate the request.

2. The DER will evaluate proposed alternative methods from the guidance of sections 2 through 6 of this document according to the same criteria as those listed in (c) above, for approval of alternate methods.

3. Verbal approvals of alternative methods (e.g. field decisions) may be granted as detailed in section 3.2.1(d) 4.

(e) The person responsible for conducting the investigation and/or remediation has a continuing obligation to ensure that the DER receives all complete, accurate and relevant information regarding investigation and/or remediation at the site, in a timely manner.

1.7 Considerations for going beyond the technical guidance

(a) The DER may request additional work beyond the minimum technical guidance set forth in this document whenever necessary for the DER to ensure a proper investigation and/or remediation, which will assure adequate protection of public health and the environment, based upon a review of the following areas:

1. The number or magnitude of the discharge(s) being investigated;

2. The nature of the substances discharged;

3. A change in the certification or other authorization of the laboratory performing analyses previously submitted for the site in question or any other site;

4. The identification of additional exposure pathways not otherwise fully investigated pursuant to the minimum requirements;

5. The identification of additional receptors not otherwise fully investigated pursuant to the minimum requirements;

6. Distance to and sensitivity of receptors and natural resources;

7. When the DER determines that additional data or information is needed to fully evaluate the nature and extent of contamination at the site;

8. When, pursuant to 6 NYCRR Part 375, additional work is required; and,

9. Any other site-specific conditions the DER identifies which necessitate the need for additional work.

(b) When the person responsible for conducting the investigation and/or remediation suspects radioactive contamination on a site, the guidance in this document may not be appropriate, and alternative methods for assessing site conditions may need to be implemented. Such sites will be investigated and remediated with Department oversight by the Division of Solid and Hazardous Materials and the NYSDOH Bureau of Environmental Radiation Protection.

1.8 Areas of concern at sites subject to this technical guidance

(a) When evaluating a site pursuant to this guidance it may be subdivided into areas of concern (AOCs) which are any existing or former location(s) where hazardous substances, hazardous wastes, or petroleum are or were known or suspected to have been discharged, generated, manufactured, refined, transported, stored, handled, treated, released, disposed, or where hazardous substances, hazardous wastes, or petroleum have or may have migrated.

(b) Areas of concern, include, but are not limited to, all current, former and suspected:

1. Bulk storage tanks and appurtenances, including, without limitation:

   i. Tanks and silos;

   ii. Rail cars or rail sidings at the site;

   iii. Piping, above and below ground pumping stations, sumps and pits; and

   iv. Loading and unloading areas;

2. Storage and staging areas, including, without limitation:

   i. Storage pads and areas;

   ii. Surface impoundments and lagoons;

   iii. Waste piles;

   iv. Dumpsters; and

   v. Chemical storage cabinets or closets;

3. Drainage systems and areas, including, without limitation:

i. Building floor drains and piping, sumps and pits, including trenches and piping from sinks that potentially received process waste;

ii. Roof leaders (when process or storage operations vent to the roof or they are adjacent to air emission points);

iii. Drainage swales and culverts;

iv. Storm sewer and sanitary collection systems (interior or exterior);

v. Storm water detention ponds and fire ponds;

vi. Surface water bodies;

vii. Leach fields; and

viii. Dry wells and sumps;

4. Discharge and disposal areas, including, without limitation:

i. Areas of discharges;

ii. Waste water treatment, collection and disposal systems, including without limitation septic systems, seepage pits and dry wells;

iii. Landfills;

iv. Landfarms;

v. Sprayfields;

vi. Incinerators;

vii. Historic fill material or any other fill material areas; and

viii. Any discharge regulated by the Underground Injection Control program

5. Other areas of concern, including, without limitation, areas where the following are or were suspected to have been present:

i. Electrical transformers and capacitors;

ii. Hazardous materials storage or handling areas;

iii. Waste treatment areas; and

iv. Discolored areas or spill areas;

v. Open areas uncharacteristic of the general site cover type away from production operations;

vi. Areas with stressed vegetation;

vii. Other discharge areas;

viii. Compressor vent discharges;

ix. Non contact cooling water discharges;

x. Areas that may have received flood water or storm water runoff from potentially contaminated areas;

xi. Structures; and

xii. Any other area suspected of containing contaminants;

6. Groundwater areas of concern, including, without limitation, present or past regulated activities under the New York State Pollutant Discharge Elimination System (SPDES) regulations for discharges to groundwater, including: seepage pits; dry wells; lagoons; and septic systems which received industrial waste;

7. Surface water areas of concern, including, without limitation, all surface water areas and associated

bottom and floodplain sediment which receive or may have received any point or non-point source discharge from the site; and

8. Fish and wildlife resource areas of concern including without limitation, all biota and areas of terrestrial, aquatic and marine habitat where contaminants are, have been or are suspected to have been discharged or have migrated.

(c) The extent to which all AOCs at a site will have to be identified is dependent upon the applicable program, as defined by section 1.2 (a), under which the site is undergoing investigation/remediation.

1.9 Health and safety plan

(a) Any person conducting investigation or remediation activities should prepare a site-specific health and safety plan which will be adhered to by all personnel involved in the investigation and/or remediation. The plan should be prepared in accordance with the most recently adopted and applicable general industry (29 CFR 1910) and construction (29 CFR 1926) standards of the Federal Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, as well as any other Federal, State or local applicable statutes or regulations. A copy of the health and safety plan should be available at the site during the conduct of all activities to which it is applicable.

(b) The health and safety plan must include a section on community health and safety with measures to ensure the public living and working near the site or facility employees or visitors are protected from exposure to site contaminants during intrusive activities or on-site treatment actions undertaken during the investigation and/or remediation of the site. At a minimum it must include the appropriate requirements for a community air monitoring plan which are included in Appendix 1A.

1.10 Citizen participation

(a) The requirements for citizen participation activities for the inactive hazardous waste disposal site remedial program are presented in 6 NYCCR Part 375 and applicable guidance is set forth in the NYSDEC Division of Environmental Remediation (DER) "Citizen Participation in New York's Hazardous Waste Site Remediation Program - A Guidebook" dated June 1998.

(b) The requirements for citizen participation activities for the environmental restoration ("brownfields") program are in 6 NYCCR Part 375 and applicable guidance is set forth in the NYSDEC DER "Municipal Assistance For Environmental Restoration Projects ("Brownfields") Program Procedures Handbook", dated December 1997.

(c) The requirements for citizen participation activities for the Voluntary Cleanup Program will be completed by the DER project manger in accordance with the NYSDEC DER "Voluntary Cleanup Program Internal Procedures Guide".

1.11 Interim remedial measures

(a) As a first priority during investigation and/or remediation, contaminants in all media should be contained and/or stabilized to reduce or eliminate, to the extent possible, receptor exposure to contaminants or to contain further movement of contaminants through any pathway. Actions taken to mitigate environmental or human exposures before the completion of the remedial investigation and appropriate remedial alternative selection, are considered interim remedial measures or IRMs. IRMs may include but are not limited to the following activities: removals of wastes and contaminated materials including environmental media; construction of diversion ditches, collection systems, or leachate collection systems; free product recovery systems; construction of fences or other barriers; posting of warning signs; installation of water filters or provision of alternative water supplies.

(b) When the need for an IRM is identified, the person responsible for conducting the investigation and/or remediation should:

1. Immediately notify the DER pursuant to Section 1.4 of this document so that the IRM can be performed

under DER oversight, pursuant to section 1.2 (b);

2. Determine whether the IRM is an emergency or non-emergency IRM; and,

3. Follow the guidance for the appropriate type of IRM provided in (c) or (d) below.

(c) An emergency IRM is an action taken in response to a situation which requires immediate containment and /or remedial actions to ensure that a release or potential release does not threaten public health and safety or sensitive environmental receptors. An emergency IRM:

1. Will not be subject to the requirements of this guidance.

2. Will be considered an initial response action and will be undertaken pursuant to the applicable requirements of the Spill Response Guidance Manual.

(d) A non-emergency IRM is an action which may be undertaken at any time during the course of the investigations detailed in section 3 and 4, in response to environmental or public health threats identified at the site. The use of a non-time critical IRM is encouraged when a source of contamination or exposure pathway can be effectively addressed before completion of the ongoing investigation and remedy selection process.

1. Non-emergency IRMs which will address:

i. Surface drum removals, construction of fences or other barriers; posting of warning signs; installation of water filters or provision of bottled water should comply with (c) above.

ii. Underground storage tanks should be conducted in accordance with the requirements of section 5.5 and are not required to comply with (d) 3 below.

iii. All other actions should be planned in accordance with the guidance for either a remedial design, section 5.2, or remedial action workplan, section 5.3, as appropriate for the level of complexity of the work proposed, and implemented in accordance with section 5.4.

2. An IRM report, in accordance with the requirements of section 5.8, should be prepared for each non emergency IRM undertaken.

3. Non-emergency IRMs will require applicable citizen participation requirements pursuant to section 1.10.

SECTION 2. QUALITY ASSURANCE FOR SAMPLING AND LABORATORY ANALYSIS

2.1 Quality assurance requirements

(a) The person responsible for conducting the investigation and/or remediation should ensure that suitable and verifiable data results from sampling and analysis. To achieve this objective the quality assurance procedures detailed in this section should be followed for all sampling and laboratory analysis activities. The person responsible for conducting the investigation and/or remediation shall consult with DER during the development of the workplan, pursuant to section 3.3, to determine whether a site Quality Assurance Officer (QAO) will be required. The QAO will review sampling procedures and certify that the data was collected and analyzed using the appropriate procedures. The QAO may not have any responsibilities specific to the collection and analysis of samples from the site for which they are the QAO. The qualifications of a QAO are included in appendix 2A.

(b) Certification and data acceptance:

1. Laboratories performing analyses should conform to the following:

i. For the analysis of any aqueous samples for a parameter or category of parameters for which laboratory certification exists pursuant to NYSDOH ELAP Certification, the laboratory will be certified for that specific parameter or category of parameters pursuant to NYSDOH ELAP Certification;

ii. For the analysis of non-aqueous samples using specific analytical methods contained in the EPA Publication SW-846, "Test Methods for Evaluating Solid Waste", third edition, update IIF, January 1995, as amended and supplemented, for a parameter or category of parameters for which certification exists pursuant to NYSDOH ELAP Certification, the laboratory will be certified for that specific parameter or category of parameters pursuant to NYSDOH ELAP Certification or, at a minimum, have obtained temporary approval to analyze regulatory samples pursuant to NYSDOH ELAP Certification

iii. NYSDOH ELAP does not certify analysis of biological tissue. Laboratories should provide documentation of ability to perform analysis of tissue samples for approval by the DER prior to conducting any tissue analysis.

iv. For analysis of samples where Category B deliverables are required by (f) i. below, NYSDOH ELAP CLP certification is required for the category of parameters to be analyzed for.

2. The DER will reject analytical data from any laboratory for which its certification for the parameter analyzed for has expired, decertified and or suspended.

(c) Analytical methods:

1. Except as provided in 2. and 3. below, analytical methods used will have been published in the most current NYSDEC Analytical Services Protocol. Where possible, the method selected must achieve a detection limit that is below the lowest standard or guidance value that applies to the media being sampled/analyzed for the contaminants that can reasonably be expected to be found.

2. If an analytical method as described in (c)1 above does not exist for a specific contaminant or parameter within a specific matrix, or if an analytical method as described in (c)1 above for a given contaminant or parameter is demonstrated to be inappropriate for the matrix analyzed, or the method cannot achieve a detection limit below the applicable standard or guidance value, then the person responsible for conducting the investigation and/or remediation will:

i. Select an appropriate method from another source;

ii. Document the rationale for selecting the method; and

iii. Develop a standard operating procedure for the method, including a quality control section.

iv. Exception: it is recognized that the analytical methods for semi-volatile compounds in soil frequently can not achieve detection limits below SCG levels. In these cases, method 8270 is acceptable irrespective of the detection limit

2. EPA Publication SW-846 is not appropriate for analysis for biological tissue and often underestimates PCB/ organochlorine concentrations. For tissue analysis, methods for each analyte to be tested must be proposed and approved by the DER prior to the analysis.

4. Methods acceptable to the DER will be utilized for the determination of the presence of free product in soil or water. Such methods include, without limitation, visual identification of sheens or other visible product, measurable thickness of product on the water table, the use of field instruments, ultraviolet fluorescence, soil-water agitation, centrifuging, and hydrophobic dye testing.

i. For contaminants that in their pure phase and at standard state conditions (20 degrees Celsius to 25 degrees Celsius and one atmosphere pressure) have densities greater than water, free product will be considered to be present if the contaminant is detected in groundwater at concentrations equal to or greater than one percent of the water solubility of the contaminant if groundwater contains only that organic contaminant. If a mixture of such contaminants is present, then the effective water solubility of the contaminant should be estimated for this determination.

5. Except for tissue samples (see 2.1(k) below), gas chromatography methods with a mass spectrometer detector system should be used for analysis of semi-volatile contaminants (exclusive of herbicides, pesticides, and PCBs). Other chromatography methods (liquid chromatography, HPLC) with appropriate detector systems should be used for the analysis of organic analytes amenable only to non-gas chromatographic methods. A mass spectrometer detector system is not required if the site has already been characterized to the extent that all contaminants are known.

(d) Specific requirements:

1. Laboratories will follow all quality assurance/quality control procedures specified in the analytical methods.

2. Sampling methods, sample preservation requirements, sample handling times, decontamination procedure for field equipment, and frequency for field blanks, field duplicates and trip blanks should conform to the NYSDEC Analytical Services Protocol (ASP), unless an alternate method/procedure has been approved in the workplan.

3. Results from analysis of soils and sediments will be reported on a dry weight basis, except for those results required by the method to be otherwise reported. Analysis of vegetation tissue shall be on a dry weight basis. All other tissue analysis shall be reported on a wet weight basis.

(e) Sample matrix cleanup:

1. Acceptable sample matrix cleanup methods include, without limitation, those methods contained in the EPA Publication SW846 or the EPA "Contract Laboratory Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration" in effect as of the date of sample analysis.

2. Sample matrix cleanup methods will be performed if:

i. Petroleum contaminated soils, sediments, or other solids are analyzed for semivolatile organics, and the method detection limits are elevated above the applicable remediation standard because of matrix interference;

ii. Gas chromatographic peaks are not adequately separated due to matrix interference. A peak will be

considered inadequately separated when a rise in baseline or extraneous peaks interfere with:

(1) the instrumental ability to correctly identify compounds present (including internal standards and surrogates), and/or;

(2) the integration of peak area and subsequent quantitation;

iii. So specified by the analytical method; or

iv. Matrix interferences prevent accurate quantification and/or identification of target compounds.

(f) Unless otherwise approved in advance by the DER, laboratory data deliverables should be as follows .

i. Category B laboratory data deliverables as defined in the analytical services protocol (ASP) should be submitted for confirmatory (post remediation) samples and final delineation samples for all sites except those listed in section 5.5. In addition, a Data Usability Summary Report should be prepared by a party independent from the laboratory performing the analysis. The required content of a DUSR is attached as Appendix 2B.

ii. Category A (as defined in the ASP) or Category Spills laboratory data deliverables should be submitted for all other analyses; and

iii. Analytical results without all quality control documentation and raw data may be provided for all intermediate sampling events and for all long-term groundwater monitoring samples where the site has DER oversight, provided the following information is submitted:

(1) A cover page, including facility name and address, laboratory name and address, laboratory certification number, if applicable, date of analytical report preparation and signature of laboratory director;

(2) A listing of all field sample identification numbers and corresponding laboratory sample identification numbers;

(3) A listing of all analytical methods used, including matrix cleanup method;

(4) The method detection limit and practical quantitation level for each analyte for each sample analysis;

(5) All sample results including date of analysis;

(6) All method blank results; and

(7) All chain of custody documentation.

iv. Upon written request, the DER may require that deliverables package be upgraded to a "Category B" data deliverables package for any sample analysis. If the backup documentation is not available to generate "Category B" deliverables or that the lab is not qualified to generate "Category B" deliverables (not ELAP-CLP lab), reanalysis or resampling and analysis is an option.

v. Identify any analytical cleanup methods, where applicable.

(g) Field screening methods, (such as immunoassay, x-ray fluoresence, and mobile laboratories) are limited as follows:

1. Field screening methods for all sampling matrices (soil, water, air, interior surfaces) can only be used under the following conditions:

i. For contaminant delineation if contaminant identity is known or if there is reasonable certainty that a specific contaminant may be present (for example, benzene, toluene, ethylbenzene, xylene in the case of sampling for a gasoline release); or

ii. To bias sample location to the location of greatest suspected contamination.

2. Field screening methods should not be used to verify contaminant identity or clean zones unless there has been an correlation study approved in advance by the DER for the specific site where screening methods are proposed for verification.

3. Where field screening is used:

i. A standard operating procedure must exist or be developed which includes :

(1) A detailed step by step procedure for the analysis method.

(2) Duplicate analysis of 10% of the samples.

(3) Quality assurance procedures (calibration standards, blanks, etc.) As specified by the method.

(4) Laboratory confirmation on 10% of the samples by a standard ASP method is required. There should be no bias in the selection of duplicate or laboratory confirmation samples, such as selecting positive detections for duplication or confirmation. The duplicate or confirmation analysis should be done on every 10th sample, selected in the order they are presented for analysis. Laboratory confirmation occurs if the correlation between field screening and laboratory results are within +/- 30%.

ii. Analysis must be done by a Field Analyst with the following minimum qualifications:

(1) Completion of a certification course or training by an experienced analyst who has demonstrated proficiency in the method; or,

(2) Demonstration of the analyst's proficiency by correlation of the analyst's results with laboratory confirmation analysis.

4. Other field screening methods may be acceptable, subject to the DER's review of documentation.

(h) The following requirements apply for selection of analytical parameters:

1. Samples from each area of concern should be analyzed for contaminants which may be present.

2. Analysis of Target Compound List plus 30/Target Analyte List (TCL+30/TAL), petroleum hydrocarbons, and pH should be conducted when contaminants in an area are unknown or not well documented, although a limited contaminant list may be used subject to the DER's approval.

(i) For all petroleum storage and discharge areas, sample analysis should be conducted pursuant to the requirements of STARS #1" Petroleum Contaminated Soil Guidance Policy." Samples taken in non-petroleum storage and discharge areas should be analyzed for the stored material. Analysis should be conducted using any gas chromatography method by a laboratory that is certified pursuant to NYSDOH ELAP for the category of parameters being analyzed for. Laboratory deliverables should be as specified in the method listed above.

(j) If tentatively identified compounds or unknown compounds are detected at concentrations in excess of the applicable SCG, they should be addressed in either of two ways listed below. If a contaminant specific SCG does not exist for tentatively identified compounds and for unknown compounds, the generic SCG (class of contaminant, e.g. semi volatile compounds) should be used.

1. If the area will be remediated and it is likely that concentration of the tentatively identified compounds/unknown compounds will be reduced by the remediation, the tentatively identified compounds/unknown compounds should be analyzed in post remediation samples to document that they no longer exceed the applicable SCG.

2. An attempt should be made to positively identify and accurately quantify the tentatively identified compounds/unknown compounds using an analytical method consistent with this section so that a remediation standard can be developed.

(k) Tissue Sampling and Analysis: If tissue analysis is required, the following Quality Assurance procedures should be followed.

1. Analysis of lipid content is required for all organochlorine compounds.

2. For gas chromatography, detector systems other than mass spectrometers are required for identification and quantification of some analyte groups depending on the extraction method used during preparation of the tissue for analysis. Proposed methods should be proposed and approved prior to analysis.

3. General EPA quality control recommendations for tissue are contained in Appendix 2C. Alternate quality control requirements may be specified depending on the specific analysis being done.

4. The Quality Assurance Project Plan (QAPP) for tissue analysis should follow the outline in the USEPA publication "Preparation Aids for the Development of Category I Quality Assurance Project Plans" (EPA/600/8-91/003).

5. Tissue sampling should follow the current procedures for biota collection, preparation, and analysis as directed by the DER.

(l) If toxicity testing is required, the quality assurance procedures contained in the latest approved EPA or ASTM methods or another method approved by the DER should be followed.

(m) If air sampling is required, the quality assurance procedures specified in the method approved by the DER for the sampling should be followed. Quality assurance procedures should follow the guidelines or direction of the NYSDOH.

2.2 Quality assurance project plan

(a) All workplans are to address quality assurance procedures. A generic QAPP should be submitted in advance for sampling using a dynamic workplan. These procedures may be incorporated into the workplan or be supplied as a separate stand alone document. If a separate QAPP, is required, the sampling requirements must also be shown in the workplan. The person responsible for conducting the investigation and/or remediation will submit necessary information in a format that corresponds directly to the outline of this section. For ease of reading, QAPP means the section or document that addresses how data will be quality assured. For large, complicated sites, the DER may require a separate QAPP. The following should be included in the Quality Assurance Project Plan:

1. The project's scope and project goals as well as how the project relates to the overall site investigation or remediation strategy;

2. Project organization, including the designation of a Project Manager, Quality Assurance Officer and Field Analyst, (if field analysis is planned). Resumes of these individuals may be requested by the DER.

3. Sampling procedures and equipment decontamination procedures.

4. Site map showing sample locations

5. An "Analytical Methods/Quality Assurance Summary Table" which should include the following information for all environmental, performance evaluation, and quality control samples:

i. Matrix type;

ii. Number or frequency of samples to be collected per matrix;

iii. Number of field and trip blanks per matrix;

iv. Analytical parameters to be measured per matrix;

v. Analytical methods to be used per matrix

vi. The number and type of matrix spike and matrix spike duplicate samples to be collected;

vii. The number and type of duplicate samples to be collected;

(h) The number and type of split samples to be collected;

ix. The number and type of performance evaluation samples to be analyzed;

x. Sample preservation to be used per analytical method and sample matrix;

xi. Sample container volume and type to be used per analytical method and sample matrix; and

xii. Sample holding time to be used per analytical method and sample matrix;

6. A detailed description of site specific sampling methods to be used, sample storage in the field and sampling handling time requirements;

7. If required by the DER, a description of the laboratories ability to provide the analytical data in electronic format. The DER will specify the format in cases where the DER requests the ability of a laboratory to provide the analytical data in electronic format.

2.3 Quality assurance glossary

"Analytical Services Protocol" or "ASP" means the NYSDEC's compendium of approved EPA and NYSDEC laboratory methods for sample preparation and analysis and data handling procedures.

"Confirmatory Sample" means a sample taken after remedial action is expected to be complete to verify that the cleanup requirements have been met. This term has the same meaning as " post remediation sample".

"Contract laboratory program" or "CLP" means a program of chemical analytical services developed by the EPA to support CERCLA.

"Data Usability Summary Report, (DUSR) " is a document that provides a thorough evaluation of the analytical data to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and use.

"Effective solubility" means the theoretical aqueous solubility of an organic constituent in groundwater that is in chemical equilibrium with a separate phase mixed product (product containing several organic chemicals). The effective solubility of a particular organic chemical can be estimated by multiplying its mole fraction in the product mixture by its pure phase solubility.

"Environmental Laboratory Accreditation Program" or "ELAP" means a program conducted by the NYSDOH

which certifies environmental laboratories through on-site inspections and evaluation of principles of credentials and proficiency testing.

"Intermediate Sample" means a sample taken during the investigation process that will be followed by another sampling event to confirm that remediation was successful or to confirm that the extent of contamination has been defined to below a level of concern.

"Method detection limit" or "MDL" means the minimum concentration of a substance that can be measured and reported with a 99 percent confidence that the analyte concentration is greater than zero and is determined from the analysis of a sample in a given matrix containing the analyte.

"Non-targeted compound" means a compound detected in a sample using a specific analytical method that is not a targeted compound, a surrogate compound, a system monitoring compound or an internal standard compound.

"Practical quantitation level" or "PQL" means the lowest quantitation level of a given analyte that can be reliably achieved among laboratories within the specified limits of precision and accuracy of a given analytical method during routine laboratory operating conditions.

"PAH" means polycyclic aromatic hydrocarbon as defined by USEPA Method 8270.

"Quality assurance" means the total integrated program for assuring the reliability of monitoring and measurement data which includes a system for integrating the quality planning, quality assessment and quality improvement efforts to meet data end-use requirements.

"Quality assurance project plan" or "QAPP" means a document which presents in specific terms the policies, organization, objectives, functional activities and specific quality assurance/quality control activities designed to achieve the data quality goals or objectives of a specific project or operation.

"Quality control" means the routine application of procedures for attaining prescribed standards of performance in the monitoring and measurement process.

" Semivolatile organic compound" means compounds amenable to analysis by extraction of the sample with an organic solvent. For the purposes of this section, semi-volatiles are those target compound list compounds identified in the statement of work in the current version of the EPA Contract Laboratory Program.

"Target analyte list" or "TAL" means the list of inorganic compounds/elements designated for analysis as contained in the version of the EPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration in effect as of the date on which the laboratory is performing the analysis. For the purpose of this chapter, a Target Analyte List scan means the analysis of a sample for Target Analyte List compounds/elements.

"Targeted compound" means a hazardous substance, hazardous waste, or pollutant for which a specific analytical method is designed to detect that potential contaminant both qualitatively and quantitatively.

"Target compound list plus 30" or "TCL+30" means the list of organic compounds designated for analysis (TCL) as contained in the version of the EPA "Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration" in effect as of the date on which the laboratory is performing the analysis, and up to 30 non-targeted organic compounds (plus 30) as detected by gas chromatography/mass spectroscopy (GC/MS) analysis. For the purposes of this chapter, a Target Compound List+30 scan means the analysis of a sample for Target Compound List compounds and up to 10 non-targeted volatile organic compounds and up to 20 non-targeted semivolatile organic compounds using GC/MS analytical methods. Non-targeted compound criteria should be pursuant to the version of the EPA "Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration" in effect as of the date on which the laboratory is performing the analysis.

"Tentatively identified compound" or "TIC" means a non-targeted compound detected in a sample using a GC/MS analytical method which has been tentatively identified using a mass spectral library search. An estimated concentration of the TIC is also determined.

"Unknown compound" means a non-targeted compound which cannot be tentatively identified. Based on the analytical method used, the estimated concentration of the unknown compound may or may not be determined.

"Volatile organics" means organic compounds amenable to analysis by the purge and trap technique. For the purposes of this chapter, analysis of volatile organics means the analysis of a sample for either those priority pollutants listed as amenable for analysis using EPA method 624 or those target compounds identified as volatiles in the version of the EPA "Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration" in effect as of the date on which the laboratory is performing the analysis.

"Waste oil" means used and/or reprocessed engine lubricating oil and/or any other used oil, including but not limited to: fuel oil, engine oil, gear oil, cutting oil, transmission fluid, oil storage tank residue, animal oil and vegetable oil, which has not subsequently been refined.

SECTION 3. SITE CHARACTERIZATION AND REMEDIAL INVESTIGATION

3.1 Process overview

(a) This section sets forth the guidance to determine whether or not a site requires remediation. This determination is made through a step-wise decision process beginning with a site characterization, consisting of a records search and followed, if needed, by a field characterization. This process concludes, where necessary, with a remedial investigation.

(b) If at any point during a site characterization it becomes evident that a remedial investigation is necessary, the project should shift directly to the remedial investigation phase.

3.1.1 Characterization

(a) The purpose of a site characterization is to identify and investigate any potentially contaminated areas of concern at a site.

(b) The site characterization is the initial two-step process to determine whether or not a site requires remediation. The steps in the site characterization process are:

1. The records search, which is conducted in accordance with Appendix 3A; and,

2. Based upon the results of the record search, the need for a field characterization will be determined and a workplan will be developed, in accordance with section 3.3, and implemented.

(c) The site characterization is intended to determine whether:

1. The applicable SCGs set forth in appendix 7A for the site, are contravened; or,

2. An adverse impact to fish and wildlife resources exists or potentially exists, as determined by section 3.10; or,

3. A public health exposure exists or potentially exists, as determined by Appendix 3B

4. The identified contamination emanates beyond the property boundary of the site being characterized; or,

5. Consequential hazardous waste disposal has been identified at the site, which represents a significant threat to public health or the environment.

(d) Based upon a review of the site characterization report, discussed in section 3.13 below, the DER will determine, where applicable:

1. If no potentially contaminated areas of concern are identified, or if no area of concern characterized is determined to require a remedial investigation pursuant to (c) 1-4 above, then no further investigation is required at the site; or,

2. The presence of contamination was identified by the site characterization and a remedial investigation pursuant to this section will be required; or,

3. The presence of contamination was identified and its nature and extent was sufficiently defined by the site characterization to allow a decision regarding remediation for the site to be made pursuant to section 4.

3.1.2 Remedial investigation

(a) For purposes of this technical guidance, a remedial investigation is necessary at each site where a site

characterization performed in accordance with this section, or other data, demonstrates and the DER concludes, that contamination is present at the site, as defined by section 3.1.1 (d) 1-3 above, and further delineation of this contamination is needed to allow a decision by the DER regarding the remediation to be undertaken at the site. The purposes of a remedial investigation are to:

1. Delineate the areal and vertical extent and mass of contaminants in all media at or emanating from the site;

2. Determine the surface and subsurface characteristics of the site, including topography and depth to groundwater;

3. Identify the sources of contamination, the migration paths, and actual or potential receptors of contaminants on or through air, soil, bedrock, sediment, groundwater, surface water, utilities, and structures at a contaminated site, without regard to property boundaries;

4. Collect and evaluate all data necessary to evaluate remedial action alternatives;

5. Collect and evaluate all data necessary to evaluate the actual and potential threats to public health and the environment. This would include evaluating all current and future potential public health exposure pathways, in accordance with Appendix 3B, as well as potential impacts to biota;

6. Collect and evaluate information for a Fish and Wildlife Resource Impact Analysis (FWRIA), if necessary. See Appendix 3C and section 3.10.1 to determine if a FWRIA is necessary;

7. Collect all data necessary to develop discharge limitations for any controlled discharge to an environmental medium which may be required for any remedial action alternative under consideration. For petroleum contaminated sites, guidance for general conditions and discharge limitations are included in section 7;

8. If appropriate, identify removal, treatment, containment, or other interim remedial measures, pursuant to section 1.11, to:

i. Remove, treat or contain any source areas identified, or

ii. Prevent, mitigate, or remedy environmental damage or human exposure to contaminants while remedial alternatives are being evaluated.

3.2 General sampling considerations

(a) A field characterization or remedial investigation should be conducted based upon the information collected pursuant to the record search requirements of Appendix 3A and should satisfy all of the following requirements:

1. The general considerations identified in(b)-(d) below, if applicable;

2. The workplan requirements of section 3.3;

3. The building interior sampling requirements in section 3.4, if applicable;

4. The soil sampling requirements in section 3.5;

5. The background soil sampling requirements in section 3.6, if applicable;

6. The groundwater sampling requirements in section 3.7, if applicable;

7. The surface water and sediment sampling requirements in section 3.8., if applicable;

8. The area-specific sampling requirements in section 3.9;

9. The fish and wildlife impact analysis requirements in 3.10; and

10. The historic fill requirements in section 3.11, if applicable.

(b) If required pursuant to an oversight document or other applicable rule, the person responsible for conducting the investigation will submit workplans pursuant to section 3.3 and reports pursuant to section 3.13 and/or 3.14 in accordance with the schedules contained in the oversight document.

(c) Geophysical surveys may be included in the field characterization or remedial investigation to identify subsurface anomalies. Typical geophysical surveying considered for site investigations include magnetometer surveys, electromagnetic terrain conductivity surveys, electrical resistivity surveys, and ground penetrating radar surveys. Geophysical techniques are recommended to delineate underground utilities such as conduits, water lines or underground storage tanks, or to focus test pit searches for buried drums, containers, and metallic objects.

(d) For the purposes of field characterizations or remedial investigations composite sampling should not be conducted, except when sampling for semivolatile compounds associated with tank investigations as detailed in section 3.9.

3.2.1 Characterization

(a) A field characterization is to determine, under the terms of the relevant oversight document, if any contaminants are present at the site at levels that indicate the need for a remedial investigation pursuant to section 3.1.1 (c). If no such contaminants are present at the site, then the DER will determine that no further investigation is required.

(b) The field characterization is the second phase of a site characterization as defined in section 3.1.1 (a) and (b).

(c) In accordance with the purpose of a field characterization, as set forth in (a) above, if at any time during the field characterization, any contamination is present at the site at levels that indicate the need for a remedial investigation pursuant to section 3.1.1 (c), then, with DER approval, the field characterization may be discontinued and the investigation/remediation continued at either the remedial investigation or remedial action phase. Therefore, it is often appropriate to phase the field characterization so that the areas of concern most likely to be contaminated above the applicable SCGs are sampled first.

(d) Sampling performed as part of the field characterization should be conducted in all potentially contaminated areas of concern, whether relating to current or former uses of the site.

1. Sampling should be biased to the suspected location of greatest contamination.

2. Samples should be biased based on professional judgment, area history, discolored soil, stressed vegetation, drainage patterns, field instrument measurements, odor, or other field indicators.

3. Sampling locations should comply with requirements listed in sections 3.4 through 3.9.

4. If access to sampling locations required pursuant to sections 3.4 through 3.11 is impractical due to physical obstructions or safety hazards, and no practical sampling alternatives are available, upon prior verbal or written approval by the DER, sampling may be modified subject to the technical criteria in section 1.6(c)3. Confirmation of any verbal or written approval by the DER should be provided in the site characterization report. For verbal approvals, the date of the verbal approval and the name of the DER representative who granted the approval should be provided in written correspondence to the DER within seven days of the verbal approval.

(e) All sampling methods and laboratory analyses should be conducted pursuant to section 2. The full Target Compound List/ Target Analyte List should be sampled and analyzed for, unless upon prior verbal or written

approval by the DER, the list can reasonably be limited based on the records search. For verbal approvals, the date of the verbal approval and the name of the DER representative who granted the approval should be provided in written correspondence to the DER within seven days of the verbal approval.

3.2.2 Remedial investigation

(a) At the onset of a remedial investigation a conceptual site model should be used to develop a general understanding of the site to evaluate potential risks to public health and the environment and assist in identifying and setting priorities for the activities to be conducted at the site. The conceptual site model also identifies potential sources of contamination, types of contaminants and affected media, release mechanisms and potential contaminant pathways, and actual/potential human and environmental receptors. A description of the conceptual site model process is included as Appendix 3D.

(b) During the remedial investigation sampling of surficial and subsurface soil, sediment and water matrices (and indoor or ambient air if appropriate) is conducted to provide a basis for the evaluation of remedial alternatives.

(c) If there are contaminant concentrations in background soils, sediments, surface water, and groundwater they may be used in the assessment of whether a site requires remediation. The number and location of background surface soil samples must follow the procedure found in section 3.6.1 to establish site-specific background soil contaminant concentrations. To support a claim that all or part of groundwater contamination detected in on-site groundwater samples is caused by background groundwater contamination, the procedure found in section 3.7.1(e) must be followed. Upgradient sediment and surface water samples which are outside the influence of site contamination, may be used to establish background contaminant concentrations in sediments and surface water.

(d) Data quality objectives are to be considered when deciding sample collection technique, the type of analysis, and the level of data documentation. Data quality objectives may include, but are not limited to: defining the site's physical characteristics, physical and chemical characteristics of contaminant sources, volume and extent of contamination, potential receptors and associated exposure pathways, the fate and transport of contaminants, the development and evaluation of remedial alternatives, identifying SCGs, identifying the need for treatability studies, and supporting future enforcement or cost recovery activities.

(e) The SCGs which pertain to the site location, site contaminants, and potential remedial actions must be identified and the probable SCGs must be listed in the Remedial Investigation report. The chemical specific SCGs must also be considered when preparing the sampling protocols for the site to ensure the use of appropriate analytical detection limits. A listing of SCGs applicable to the remedial investigation is included in section 7.4.

(f) If a building interior investigation is required by the criteria in section 3.4, it should be included as part of the remedial investigation.

(g) If required pursuant to an oversight document or other applicable rule, the person responsible for conducting the investigation will submit a remedial investigation workplan pursuant to section 3.3 and a remedial investigation report pursuant to section 3.14 in accordance with the schedules contained in the oversight document and/or workplan.

3.3 Workplan

(a) The workplan is a document that requires approval by the DER and is then taken into the field to govern the identification of all field aspects of a site characterization or remedial investigation. At a minimum, the workplan will include the sections identified in (d) below. Two other important components of the technical workplan consist of site specific health and safety protocols and Quality Assurance/Quality Control (QA/QC) protocols. Citizen participation activities may also be identified in the workplan as appropriate (see section 1.10).

1. The workplan is prepared after a records search (a previously documented records search may be sufficient, if consistent with Appendix 3A) and a site visit have been completed. If the investigation is directed at either a specific discharge event, an underground storage tank, or tank system, then no records search is needed.

Interviews with past and present facility personnel, adjoining property owners, and others familiar with past activities at the site, as discussed in Appendix 3A, should also be considered to complete the site history. A site visit should be made before the workplan preparation to confirm and update the results of the records search, as well as to note any access restrictions or other site conditions which may affect the investigation of the site. Where site conditions are not already well known, appropriate monitoring instruments such as organic vapor analyzers (OVAs), photoionization detectors (PIDs), explosimeters, oxygen detectors and radiation detectors are to be used to ensure personal safety and assist with characterization of the site, in addition to any additional worker safety measures required by law..

2. The workplan should reflect that the site-specific QA/QC protocols to be used during the remedial investigation must conform with the requirements of Section 2. The QA/QC section of the workplan is to determine whether a project quality assurance officer, will be required in accordance with section 2.1 (a). The workplan is to indicate the sampling and analytical protocols and data deliverables to be followed for obtaining and evaluating data of sufficient quality to support decisions during the remedial process. Data evaluation requirements (data validation and/or a DUSR) are to be defined in the QA/QC protocols. Analytical methods identified are to provide a low enough detection limit to compare with all applicable SCGs. A list of potential SCGs is included in section 7.

3. Health and safety protocols, consistent with section 1.9 must be utilized during the field activities at the site. In addition, community air monitoring consistent with section 1.9 may be needed for sites contaminated with volatile organic compounds or where contaminated particulates might be generated by investigative activities, or where nuisance odors may be encountered.

(b) The workplan should include:

1. A detailed schedule for all activities, including time lines and target dates for the start and completion of all field activities and submission of all reports to the DER.

2. A list detailing the names, contact information and roles of the principal personnel who will participate in the remedial investigation including the project manager and, if applicable, a facility contact, responsible party contact and contractor and subcontractor contacts. If the principal personnel designated on the project change, information for the new personnel must be submitted to the DER in a timely manner. Qualifications of these personnel must be included as an appendix to the workplan.

3. A summary of the results of the records search, site visit, and interviews, done under (a)1. above with a focus on identifying historical chemical/petroleum product usage, potential contaminant sources, and possible migration conduits including all subsurface utilities.

4. Descriptions of the following, unless the investigation is directed at either a specific discharge event, an underground storage tank, or underground storage tank system:

i. The physical conditions of the site and surroundings, including a general description of soils, geology, hydrogeology, and topography, including site drainage patterns;

ii. The usage, distance to, flow direction (if appropriate) and names of surface water bodies, as well as public/private drinking water supply wells within at least one half mile of the site with emphasis upon water bodies and supply wells topographically or hydraulically downgradient of the site that may be in the path of site discharges or runoff. A map which shows the location of residences and other sensitive receptors must be included;

iii. A copy of the United States Geologic Survey (USGS) 7.5 minute topographic quadrangle that includes the site and an area of at least a one half mile radius around the site. This map should be that USGS revision in effect at the time of the report and must clearly note the site location and property boundaries;

iv. If appropriate, a wetlands map from the "National Wetlands Inventory" will be included;

v. Copies of appropriate historical sampling locations and analytical results with a summary and interpretation of those results;

vi. Land use within a half mile radius of the site boundary including proximity of the site to sensitive human receptors (for example, residences, schools, parks) including a database search of other known contaminated sites or spill sites in this area.

vii. Any major infrastructure (storm drains, sewers, underground utility lines, piping tunnels, subways, etc.) that may affect contaminant migration.

5. A description of each area of concern including approximate dimensions, suspected contaminants, suspected source of discharge, and potential receptors. Individual area of concern maps must be scaled at one inch to 40 feet or less to clearly indicate possible source areas and sampling locations;

6. A summary table of proposed sampling and analysis should be presented in the workplan text or on the sample location map specified in section (b)7 below, which includes:

i. Location (use the same alpha or numeric designation as shown on the scaled sampling location map);

ii. Matrix (waste, soil, surface water, groundwater, sediment, air, or biota as appropriate);

iii. Sample depth (soils/sediments/surface water) or water bearing zone to be sampled (groundwater);

iv. Analytical parameters for each sample (for example, TAL metals or semivolatile compounds);

v. Sampling method; and

vi. The rationale for each sample (for example, to delineate the nature and extent of contamination, assessing exposure/risk, or in support of potential remedies).

7. Proposed sample locations should be indicated on a sample location map which is scaled at one inch to 40 feet or less and which is keyed to the site map;

8. Proposed sampling and analysis for the FWRIA Resource Characterization, if determined necessary. See Appendix 3C and section 3.10.1 to determine if a FWRIA is necessary and should be included in the remedial investigation workplan.

9. For remedial investigation projects, identification of data collection needs for monitored natural attenuation (see (c) below), potentially feasible cleanup technologies and presumptive remedies, if appropriate (for sites such as petroleum releases, dry cleaners, landfills, etc.).

(c) When submitting an remedial investigation workplan for a site which will or may evaluate monitored natural attenuation (MNA) during remedy selection, pursuant to section 4, the person responsible for conducting the remedial investigation should collect sufficient data to:

1. Demonstrate to the DER that groundwater contaminant concentrations will decrease to applicable groundwater or surface water standards through degradation, retardation, or dispersion under present site conditions, in a reasonable time frame.

i. The person responsible for conducting the Remedial investigation should evaluate the following site conditions to determine the viability of monitored natural attenuation:

(1) Contaminant mass, as determined by free or residual product and dissolved phase delineation and dissolved contaminant concentrations;

(2) Dissolved oxygen, nitrate, iron, manganese, sulfate, methane content and oxidation/reduction potential of groundwater;

(3) Presence or absence of microorganisms in soil and groundwater;

(4) Groundwater flow velocity;

(5) Applicable physical and chemical characteristics of contaminants and contaminant degradation products present in both soil and groundwater;

(6) Other wells and the location of those used for potable water supply;

(7) Sorptive and desorptive characteristics of the soil; and

(8) Other data deemed necessary by the NYSDEC or NYSDOH.

2. To adequately delineate the extent of any free product and/or grossly contaminated soil in the unsaturated and saturated zones, as determined pursuant to Section 2.1(a)9. For MNA to be evaluated as a remedy in section 4 there must be sufficient data to develop treatment or removal alternatives, if practicable, or containment if treatment or removal are not practicable, during the remedy selection evaluation in section 4;

3. To adequately delineate the extent of soil contamination in the unsaturated zone in order to allow the development of a MNA remedy(ies) in section 4 which will remediate these soils to the applicable soil remediation SCGs in accordance with a schedule approved by the DER;

4. To ensure that groundwater contamination has been delineated to the standard applicable to the nearest downgradient receptor, applicable groundwater or surface water standards will be used.

5. To ensure that groundwater contaminated above the applicable standard will not reach the nearest downgradient receptor, as predicted by an appropriate groundwater flow/contamination transport model selected pursuant to DER approval;

6. To ensure that the fate of the contaminant plume has been documented;

7. To ensure that contaminant levels in groundwater do not present a vapor risk to any receptors. This determination will be made on a case by case basis;

8. To ensure that predicted impacts to potential receptors are consistent with the current and potential groundwater uses. This should include, without limitation, information pertaining to the existence of water lines, information pertaining to locations which are or may be suitable for the placement of public water supply wells proposed future installation of water lines, local and/or county ordinances restricting installation of potable wells;

(d) The workplan should include the following sections:

1. Introduction or purpose

2. Site history and description

3. Workplan objectives, scope and rationale

4. Quality assurance/quality control protocols

5. Health and safety protocols

6. Reporting and schedule

7. Citizen participation activities, references and appendices as appropriate

3.4 Building interiors

(a) The characterization or remedial investigation of building interiors should be conducted when contaminants inside the building have the potential to migrate to the environment outside the building or when contaminants outside the building have the potential to migrate into the building.

1. Requirements for investigating contaminants inside buildings, or associated with tanks and above or below ground means of conveyance of solids or liquids of any kind including piping, plumbing, floor drains, vents, trenches, duct work, gutters, leaders, or fissures in floors, walls or ceilings that create pathways inside the building, which have the potential to migrate to the environment outside or under the building are found in the area specific investigation procedures specified in section 3.9; or,

2. Requirements for investigating contaminants outside the building, which have the potential to migrate into buildings, potentially impacting public health, will be specified by the DER and NYSDOH on a site-specific basis.

(b) If evidence of prior activities or areas of concern are identified that may have impacted the building structure, an investigation will need to be done under the guidance of NYSDOH.

(c) Investigation of asbestos and lead based paint should follow applicable State and Federal guidance and regulations.

3.5 Soil

3.5.1 Characterization

(a) Soil investigations should satisfy the following elements when performed as part of a field characterization:

1. A survey for buried drums, tanks or waste using test pits, ground penetrating radar, magnetometry electromagnetics, or other techniques capable of detecting metal containers and other waste to an average depth of 20 feet or deeper should be conducted if:

i. There have been any indications of buried drums, tanks or waste;

ii. Groundwater contamination is detected and no source has been identified; or

iii. Aerial photographic history of the site indicates the presence of drums, tanks or waste in or adjacent to regraded and/or filled areas.

2. Soil samples should be collected via soil borings and/or test pitting for chemical analysis and to provide a profile of subsurface conditions. The profile should meet the following:

i. Logs should be prepared for all soil samples to document subsurface conditions including, without limitation, soil types and description of non-soil materials, field instrument measurements, depth to groundwater, if groundwater is encountered; and document, if present, soil mottling, presence of odor, vapors, soil discoloration, and free and/or residual product;

ii. Soil should be described using the New York State Department of Transportation soil description procedure (NYSDOT Soil Mechanics Bureau STP-2 dated May 1, 1975, as amended).

iii. Hazardous waste and grossly contaminated soil will not be returned to the subsurface and must be disposed of in accordance with applicable guidance and regulations. If contaminated materials are returned to the ground, then the person responsible for conducting the investigation should address the presence of this

contamination as part of the remedial action workplan; and

iv. Soil sample locations may be photo-documented.

3. Soil samples (except samples being analyzed for volatile organics) should be collected in accordance with the definition of "surface soil samples" in section 1.3 except as required pursuant to section 3.9.

4. Soil samples for suspected surface discharges to be analyzed/screened for volatile organics should be collected using a coring device, if practicable, to minimize contaminant loss during sampling. Each core should be field screened with a properly calibrated photoionization detector or flame ionization detector (PID/FID) or other suitable instrument pursuant to section 2.1(b).

i. When field screening is used the following should apply:

(1) At a minimum, the initial 24 inches of soil should be cored and field screened for the presence of volatile organics;

(2) If field measurement readings are detected above background, the coring should be extended until background readings are achieved, or groundwater or bedrock is encountered;

(3) An undisturbed sample from the two foot interval registering the highest field measurement reading should be collected and analyzed for volatile organics;

5. Samples should be collected continuously in discrete increments. If less than full recovery is obtained by the sampling technique, an explanation should be provided in the soil log.

6. Additional sampling of increments below those specified in (a)3 and 4 above should be completed in cases where the surface has been regraded or if physical evidence in borings or other evidence which indicate the possible presence of contamination.

7. If the designated soil sampling point is within the saturated zone, a sample of the saturated soil should be collected, when sample recovery is possible, and analyzed.

(b) Field screening techniques such as soil gas surveys, immunoassay methods, and X-ray fluorescence, are encouraged. See section 2.1 (h) for limitations. Soil gas detection methods may be used to bias soil or groundwater sample locations. Soil gas surveys are currently considered in conjunction with geophysical surveys or in place of geophysical techniques when and where volatile organic compounds are of concern in unsaturated soils.

(c) The characterization of soil should be conducted:

1. For the purposes of a field characterization pursuant to section 3.1.1(c); and

2. According to the quality assurance and quality control requirements pursuant to section 2.

3.5.2 Remedial investigation

(a) The remedial investigation should include a study of all soil which may contain contaminants above the applicable SCGs. Soil sampling during the remedial investigation is to be biased toward locations expected to be contaminated, but it is also intended to determine the areal and vertical extent of those areas found to be contaminated. In addition, soil data is used in the exposure assessment to identify any unacceptable exposures.

(b) The testing of soil for the purposes of a remedial investigation (see section 3.1.2) is to be performed consistent with:

1. The quality assurance and quality control requirements found in section 2; and

2. The technical requirements for soil investigation pursuant to section 3.5.1.

(c) For surficial soil samples, a depth of 0 to 2 inches below the vegetative cover is required for assessing public health exposures. For ecological and garden soil assessments, a depth of 0 to 6 inches is required for exposure assessment purposes.

(d) Geophysical surveys as described in section 3.5.1, may also be used during the soil investigation. Geophysical surveys are used to identify subsurface utilities, geologic characterization (bedrock, clay layers, etc.), as well as to focus the location of test pits and/or borings to the most likely source areas (underground storage tanks, buried drums, or other metallic containers).

(e) The use of field screening techniques referred to in section 3.5.1 is encouraged to focus the location of subsurface sampling to the most likely source areas and to indicate a potential for indoor air infiltration.

(f) Subsurface soil investigations are required in any area where it is likely that contaminants migrated downward from the surface or were released below ground surface (a dry well, leach field, injection well, underground storage tank, etc.), in any area where the investigation of a geophysical or soil gas anomaly suggests a possible contaminant source, in areas of waste disposal to delineate the boundaries of that waste, and in any area of known surficial contamination to determine the vertical extent of that contamination. When test pits/trenches are excavated, written logs of test pit/trench contents and documenting the interface between waste and native soils (if appropriate) must be made. A photographic record of such excavation areas is also recommended to document subsurface features.

(g) If subsurface soil contamination with volatile organic compounds is confirmed, evaluate any subsurface utilities, basements or other structures to determine whether vapor hazards, as a result of the soil contamination, may exist for receptors associated with the utility or structure. Contaminant specific analyses used to evaluate human exposures must have detection limits within the range of levels typically found in indoor air. Measurement of oxygen levels, lower explosive limits (LEL) and the presence of organic vapors should be included in this evaluation; and,

(h) Evaluate the current and future use of the site and off-site areas.

3.6 Background soil evaluation

3.6.1 Characterization

(a) If during the field characterization, a suspected contaminant is found in surface soil in any area of concern in excess of the applicable SCGs, the following approach may be used to demonstrate to the DER that the contaminant concentration is due to background:

1. Demonstrate that a previous background evaluation conducted pursuant to (a)3 below, identified contaminant concentrations in soil near the site at the same concentration as the soil found on the site under investigation; or

2. Demonstrate that the contaminant concentrations at the site are due to background conditions by meeting all of the following:

i. The contaminant of concern was never used, stored, or disposed on the site as documented pursuant to section 3.1.1 (b); and

ii. The chemical concentrations detected in the soil at the site are within the ranges reported in appropriate references for background levels for New York (see Section 7.4 (b) 18 - 21); and

iii. The distribution of the chemical in the soil does not follow a concentration gradient indicative of a discharge; and

iv. Soil boring logs indicate the samples were not collected from historic fill material.

3. Conduct a background evaluation as follows:

i. A minimum of five background samples should be collected from unimpacted areas on the site or in the vicinity of the site. The sample should be collected from a depth which conforms to the same depths sampled during the soil investigation conducted pursuant to section 3.5.1 (a) 3.

ii. Background samples should be collected at locations unaffected by current and historic site operations as documented by the records search including aerial photographs. Wherever possible, background samples should be collected from locations which are topographically upgradient and upwind of contaminant sources;

iii. Background samples should not be collected from the following areas:

(1) Parking lots, roads, or roadside areas;

(2) Areas where materials or wastes were loaded, handled, or stored;

(3) Waste disposal areas;

(4) Areas near railroad tracks;

(5) Areas of historic fill material;

(6) Areas receiving runoff from areas (a)3iii(1) to (5) above or adjacent sites;

(7) Storm drains or ditches receiving runoff from the site or adjacent sites;

(8) Depositional areas from point sources; or

(9) Any other area of concern.

iv. Background samples should be collected and analyzed using the same methods as were used for area of concern samples;

v. Background samples should be collected from soil types similar to the area of concern samples. Similar soil types should be identified using standard classification systems pursuant to section 3.5(a)2ii;

4. The highest contaminant concentration found in the background samples should be applied as an upper limit for the contaminant concentrations found on the site. If contaminant concentrations are found at any sampling location on the site exceeding the highest concentration found in the background samples, a Remedial investigation should be conducted; and

5. Samples collected for an area of concern investigation should not be averaged for background comparisons.

(b) If during the field characterization a contaminant concentration is found in any area of concern in excess of the applicable SCGs, the person responsible for conducting the investigation and /or remediation may demonstrate to the DER that the elevated contaminant concentration is not due to an on-site discharge .

3.6.2 Remedial investigation

(a) If a background level identified by section 3.6.1 is to be proposed as a remediation level at the site, a more extensive sampling program to allow a statistical analysis of background levels may be required.

(b) If a statistical analysis is undertaken, the background data set should be examined for statistical outliers as follows:

1. An outlier is defined as a concentration greater than 1.5 times the range of the 25th to 75th percentile, plus the concentration of the 75th percentile. For example, if the 75th percentile concentration in a data set is 9 ppm and the 25th percentile is 3 ppm, subtract 3 from 9 and multiply the result by 1.5. This would equal 9 ppm. Add the result to the 75th percentile for a concentration of 18 ppm. Any sample point above 18 ppm would be considered an outlier. The background sample data should be transformed to natural logarithms before performing the outlier test because it is assumed that natural background chemical concentrations are log normally distributed; and

2. An outlier should not be considered part of background unless the chemical concentration is confirmed with the analysis of an additional sample from the outlier location. If the difference between the original and confirmation sample results is no greater than 20 percent, the average concentration of the two samples should be considered the highest background concentration.

3.7 Groundwater

3.7.1 Characterization

(a) The investigation of each area of concern should include at least one groundwater sample from each monitoring point. As a minimum, each site will require 3 cased groundwater monitoring points to determine groundwater flow direction, in accordance with section 3.7.2 (a) 5.iii (2). More than one round of groundwater sampling and analysis may be required by the DER in some situations.

(b) The investigation of groundwater should be conducted for the purposes of a field characterization pursuant to section 3.2.1 (a) according to the following:

1. The quality assurance and quality control requirements pursuant to section 2.1;

2. Groundwater samples may be taken pursuant to any generally acceptable sampling methods pursuant to section 1.6(c). Sampling techniques generally acceptable to the DER include, but are not limited to obtaining groundwater samples from monitoring wells, from drinking water wells, from well points, through slotted augers, using direct push (Geoprobe®) techniques, and using Hydropunch® techniques;

3. The groundwater sampling points should be located in:

i. The excavation of any source(s) of contaminants, if possible, including without limitation, tanks, tank distribution systems, seepage pits, septic systems, dry wells or other injection wells; or

ii. The expected downgradient flow direction of the area of concern and within 10 feet of the area of concern; groundwater flow direction should be predicted based on topographic relief, the location of surface water bodies, structural controls in the bedrock or soils, location of pumping wells and subsurface conduits at or below the water table. Groundwater flow direction may also be predicted based on data from adjacent sites if groundwater flow direction at the adjacent site has been determined pursuant to section 3.7.2 (a) 5. iii (2).

(c) The minimum number of groundwater samples collected should be as follows:

1. At least one groundwater sample for each area of concern which is classified as a seepage pit, septic system, dry well or other injection well sampled pursuant to section 3.9(e)3;

2. At least one groundwater sample for sites with leaking underground storage tanks and tank fields containing up to three tanks with a maximum capacity of 10,000 gallons per tank. If a leaking tank is excavated, the groundwater sampling point should be located within the excavation, if possible;

3. Pump islands and associated piping greater than 25 feet from the tank field should be considered separate areas of concern and should require a separate groundwater sample location; and

4. At least one groundwater sample for all other areas of concern, unless the area of concern is within 10 feet, and hydraulically upgradient, of another groundwater sampling location.

(d) The results of any groundwater site investigation analysis should be evaluated as follows:

1. If the contaminant concentrations found in all groundwater samples are below the applicable SCGs, no further investigation is necessary for groundwater;

2. In general, if groundwater contamination is detected above applicable SCGs, a groundwater remedial investigation should be conducted.

(e) If during the field characterization, groundwater contamination is detected above applicable SCGs, the following approach may be used to demonstrate to the DER that all or part of the on-site contamination is due to background groundwater contamination.

1. Groundwater flow direction should be determined pursuant to section 3.7.2 (a) 2.

2. A minimum of one background monitoring well should be installed in each water bearing zone that is believed to contain background groundwater contamination. A sufficient number of additional monitoring wells should be installed to conclusively determine the groundwater flow direction and to evaluate all off-site sources potentially affecting on-site groundwater quality. All monitoring wells should be installed in accordance with applicable guidance (e.g., "NYSDEC Division of Spills Management Sampling Guidelines and Protocols September 1992"). Each background monitoring well should be located:

i. Beyond the influence of all on-site areas of concern;

ii. At the upgradient property boundary of the site, as determined by section 3.7.2 (a) 2.

iii. Such that the off-site groundwater impacting this well will migrate along a predicted groundwater flow path that will intercept the area of concern; and

iv. Outside the zone of influence of any nearby pumping wells that would prevent upgradient groundwater from flowing onto the site.

3. Background monitoring well(s) should be sampled concurrently with collection of on-site groundwater samples for all on-site contaminants believed to be originating from background sources;

4. Results of the background groundwater investigation should be evaluated as follows:

i. No further investigation is required for groundwater if:

(1) There is no additional evidence of an on-site discharge; and

(2) Contamination is present in the background monitoring well(s) at similar or greater concentrations.

ii. Additional investigation may be required when contamination is present in the area of concern monitoring well but not in the background monitoring well or contamination is present in both the area of concern

monitoring well and the background monitoring well. In these cases, the DER should consider the contribution of the background contamination in the determination of the applicable groundwater SCGs for the site. Factors for determining the contribution of the off-site contamination to on-site contamination should include, but not be limited to, contaminant attenuation rates, contaminant degradation rates, and groundwater flow velocity; and

5. The person responsible for conducting the investigation should notify the DER pursuant to section 1.2(b) if that person determines, pursuant to (f)4 above, that groundwater contamination exists upgradient of the site.

(f) Hydraulic conductivity and flow velocities should be determined using field tests and appropriate calculations.

3.7.2 Remedial investigation

(a) When groundwater contamination is suspected/confirmed, based on the investigation done under section 3.7.1, evidence of groundwater contamination at levels exceeding standards, or other evidence (e.g. significant contamination of soil by water soluble contaminants), groundwater investigations are required. Groundwater investigations must be supervised by a qualified geologist or hydrogeologist. The focus of this remedial investigation is to delineate and vertically profile the contaminant plume (LNAPL, DNAPL and dissolved) and to identify actual or potential impacts to sensitive receptors. The investigation should take into account the physical and chemical properties of the contaminants of concern. It is also important to determine whether the contaminant plume is expanding, contracting or stable before a remedy is selected.

1. In general, the same technical requirements identified in section 3.7.1 are used for groundwater remedial investigations. Groundwater remedial investigations must also comply with the quality assurance and quality control requirements found in section 2.

2. Placement of monitoring wells/groundwater sampling points should consider the expected downgradient flow direction of suspected/confirmed source areas. If uncertain, groundwater flow direction must be determined by the placement of at least 3 wells/piezometers in each affected aquifer or water bearing zone to determine groundwater flow direction in that zone. Locations of wells/piezometers should be based on topographic relief, the location of surface water bodies, structural controls in the bedrock or soils, location of pumping wells, the density of suspected contaminants (DNAPLs), and subsurface conduits at or below the water table, at a minimum. Drilling logs and well construction logs must be prepared for all borings and monitoring wells. An electronic copy of the scaled site map, including all sampling locations, should be supplied to the DER in .dxf (or other agreed upon) document format.

3. The minimum number of groundwater samples collected should be as follows:

i. At least one groundwater sample for each area of concern which is classified as an Underground Injection Control (UIC) unit as defined by the USEPA, including without limitation, seepage pits, septic systems, dry wells or other injection wells;

ii. At least one downgradient groundwater sample for sites with leaking underground storage tanks and tank fields containing up to three tanks with a maximum capacity of 10,000 gallons per tank. If a leaking tank is excavated, the groundwater sampling point should be located within the excavation, if possible;

iii. Pump islands and associated piping greater than 25 feet from the tank field should be considered separate areas of concern and should require a separate groundwater sample location; and

iv. At least one groundwater sample for all other areas of concern unless the area of concern is within 10 feet hydraulically upgradient of a groundwater sampling location.

4. Typically, a minimum of two rounds of groundwater samples are analyzed from each monitoring well installed as part of an Remedial investigation. The first round of groundwater samples are analyzed for all suspected site-related contaminants. The second round of sampling may be modified to eliminate non-critical

wells and/or eliminate specific parameters based on the analytical results of the first round. If more than one round of sampling is anticipated, it is desirable to have sampling events coincide with seasonal high and low water.

5. The results of initial groundwater analyses are evaluated as follows:

i. If the contaminant concentrations found in all groundwater samples are below the applicable SCGs, the DER concurs that the monitoring wells were properly located and screened, and no surface water impacts are identified, no further investigation is necessary for groundwater.

ii. If the contaminant concentrations found in any groundwater samples exceed the applicable SCG, the groundwater may be re-sampled to confirm the presence of contamination. This confirmation sampling should include at least one additional sample round, taking into consideration the seasonal variability (wet or rapid snow melt versus dry) of the site area;

iii. If groundwater contamination above the applicable SCGs has been confirmed, the requirements in items 1 through 9, below, must be implemented using the "Strategy for Groundwater Remediation at Contaminated Sites in New York State".

(1) Delineate the vertical and areal extent of groundwater contamination and the sources of groundwater contamination, without regard to property boundaries, including, but not limited to, the extent of free product (dense or light, non-aqueous phase liquid-NAPL). The Remedial investigation must determine which on site sources contribute to that contamination and should collect sufficient data to evaluate remedial measures to address that contamination.

(A) The presence of DNAPL should be considered when contaminant concentrations in groundwater exceed 1% of the solubility of the compound in question in water. In these instances, the investigation should include at a minimum a boring to the first aquitard identified for visual observation and head space screening of soil samples. If DNAPL is identified or remains suspected, a short-screened well should be placed directly on top of the aquitard for groundwater sampling.

(2) Determine the direction of groundwater flow and impacts to groundwater as follows:

(A) A minimum of three groundwater monitoring wells or piezometers are required in each affected aquifer or water bearing zone to determine the groundwater flow direction in that zone. Monitoring multiple water bearing zones (including bedrock aquifers if appropriate) may be needed to define the vertical migration of contamination in groundwater, especially for contaminants which are heavier than water or where contaminants have migrated a significant distance from their sources, thus having a greater amount of time to be displaced downward. The monitoring wells or piezometers must be properly installed and surveyed relative to a permanent surface structure to provide for adequate triangulation;

(B) At least one round of synoptic static water levels must be obtained to provide a more accurate indication of the groundwater flow direction;

(C) If the site is located in an area that is influenced tidally or by man-made structures (dams which may greatly change the levels of surface water bodies), synoptic ground and surface water levels should be collected using data logging pressure transducers (or similar devices) continuously over a two day period from all applicable wells and the surface water, during a fair weather sampling event.

(D) Water level measurements and groundwater flow determinations must take into account activities in the area which affect flow direction, such as local dewatering activity and/or steady rate, variable rate, or seasonally used pumping wells. The water levels should also be taken periodically to evaluate temporal or seasonal variations inflow direction;

(3) If appropriate, conduct aquifer tests which may include pumping tests, packer tests, and slug tests or other appropriate analysis to adequately characterize the impacted aquifer at the site. At a minimum, this

must include the site water table gradient, sustained well yield, hydraulic conductivity (K), permeability, and an estimate of the rate of groundwater and contaminant flow in the aquifer. If pumping the aquifer is determined to be a feasible option for remediation, then additional aquifer characteristics such as transmissivity and storativity should be determined through the use of a pumping test. All water resulting from pump tests, well development and/or well purging before sampling, must be discharged/disposed of pursuant to applicable guidance and regulations. Highly contaminated water containing NAPLs or free product will be containerized and properly disposed;

(4) The DER relies on the proper characterization of groundwater impacts using groundwater analytical data. However, in some instances, groundwater analytical data may be supplemented with groundwater modeling to assess contaminant fate and transport. If a model is used to simulate groundwater flow and/or contaminant fate and/or transport, documentation acceptable to the DER should be provided in the Remedial investigation report (see section 3.14) supporting that the model type and application were appropriate. Specific details on the type of model, and the model application such as but not limited to, input parameters used and referenced, boundaries and limitations, calibration and matching data and success, and application intent and/or strategy of the model must be submitted to the DER upon request along with a justification as to why the model was selected. Data will be presented graphically as groundwater gradient and contaminant plume maps. Electronic data files of all computer programs used to present the data, including a base map in .dxf format, will be included with the report;

(5) If there is a current or likely release of contaminants to off-site receptors, a well search must be conducted, including:

(A) A file search using all available Department, State Health Department, county health departments, and local records for all monitoring wells (if available) and domestic wells within one thousand feet of the site boundary and all irrigation, industrial, and public supply wells within one mile of the site boundary;

(B) If applicable, the type of well and the status of the well (active, inactive, properly abandoned). If possible, total depth, casing length, open bore hole or screened interval, sample analysis (if available), copies of well records and or well logs on file with the Department, State Health Department, county health Departments, or appropriate county/local water authority, and any additional records available in county or municipal records should be included;

(C) A listing of all sources referenced in performing the well search, including agencies that were unable to provide the information requested. If sufficient data can not be obtained from existing records to exclude the presence of potable, domestic or public supply wells within 1000 feet of the site boundary, a door to door survey of the area must be performed to provide the data;

(6) Sample any existing potable and supply wells identified in the well search which are potentially impacted by the site in question;

(7) Evaluate any surface water body that may be impacted by the contaminated groundwater in accordance with section 3.8;

(8) Evaluate any subsurface utilities, basements or other structures to determine whether vapor hazards as a result of the groundwater contamination may exist for receptors associated with the utility or structure. Contaminant specific analyses used to evaluate human exposures must have detection limits within the range of levels typically found in indoor air. Measurement of oxygen levels, lower explosive limits (LEL) and the presence of organic vapors should be included in this evaluation, as appropriate; and

(9) Evaluate the current and potential groundwater uses.

3.8 Surface water, sediments and wetlands

3.8.1 Characterization

(a) If a surface water body is on or adjacent to the site or could be impacted by a discharge from the site via groundwater, storm sewers, ditches, or other methods of conveyance, the person responsible for conducting the investigation should determine if there is any evidence that discharges to the surface water body have occurred or are occurring. Such evidence should include, without limitation:

1. Known historical or on-going discharges to the surface water body, as determined pursuant to section 3.1;

2. Stressed vegetation, sheens, seeps, discolored soil or sediment along the shoreline, or on the bottom, or the surface, system hydraulics such as stream flux (the rate at which a stream is gaining or losing water);

3. Evidence of stream impacts from historical discharges including historical ecological studies documenting differences in organism population density and diversity in areas potentially impacted by the site relative to areas not impacted by the site; or

4. Existing on-site groundwater contamination in excess of the applicable SCGs. On-site groundwater contamination in excess of the applicable surface water criteria should be delineated to the applicable surface water criteria. Groundwater delineation samples should be collected along the groundwater flow path between the area of concern and the surface water body and analyzed for applicable contaminants.

(b) If there is evidence that discharges to the surface water body have occurred, pursuant to (a) above, then a surface water investigation is required. The investigation of surface water and sediment should be conducted according to the following:

1. The quality assurance and quality control requirements pursuant to section 2;

2. Surface water samples are required to evaluate standing water bodies, or, for flowing water, upgradient, downgradient, and discharge point water samples are required when there is reason to believe surface water may have been impacted by contamination emanating from the site. Sampling should be designed to account for seasonal or short-term flow and water quality fluctuations due to dry versus wet weather flow, system hydraulics (obtaining flow-proportioned samples where applicable) and potential contaminant characteristics (for example, density, solubility, and hardness for metals analysis); and

3. Sediments in surface water bodies should be analyzed when there is reason to believe sediments may have been impacted by contamination emanating from the site as follows:

i. Sediment sampling for streams and similar water bodies should be completed in accordance with section 3.9 (d) 3 (Swales/Culverts).

ii. Sediment sampling for ponded bodies of water should be completed in accordance with 3.9 (c) (Surface Impoundments).

iii. In addition to other required analyses, surface water sediments should also be analyzed for total organic carbon. These data are required to develop appropriate SCGs.

3.8.2 Remedial investigation

(a) Any surface water, wetlands or sediments which may have been impacted by contamination emanating from the site, based on the results of the requirements found in section 3.8.1, must be studied in the remedial investigation consistent with the following:

1. Surface water and sediment sampling should be designed to account for the seasonal or short-term flow and water quality fluctuations (dry vs. wet weather), system hydraulics (flow proportioned sampling), stream flux (rate at which a stream is gaining or losing) and potential contaminant characteristics (density, solubility, etc.).

2. Sampling stations must be located upstream and downstream of the contaminated site, at any existing point source discharges at that site, any zone of identified contaminated groundwater discharge, and at any proposed discharge locations. At a minimum, two surface water samples and five sediment samples will be required for determining background, see (b) below.

3. Water and sediment analysis must include each constituent of concern potentially emanating from a site with at least one sample set taken during critical, low flow conditions. All sediment samples should also be analyzed for total organic carbon, to allow for the use of sediment quality assessment formulas.

4. Depending on site-specific conditions, additional samples may be necessary to define loads from other point sources, tributaries, and other non-point sources.

(B) If a background level identified by the sampling described in (b) above is to be proposed as a remediation level at the site, a more extensive sampling program to allow a statistical analysis of background levels may be required. If a statistical analysis is undertaken it should follow the guidance in section 3.6.2 (b).

3.9 Area specific requirements for tanks, storage facilities, water treatment, drainage structures, etc.

(a) The field characterization or remedial investigation should also satisfy the following sampling requirements for bulk storage tanks and appurtenances, including, without limitation, all in-use and out of service storage tanks with a storage capacity greater than 55 gallons, and associated piping, dispensers and fill points.

1. For aboveground tanks over unpaved soil:

i. Sampling around tanks with shell or bottom in direct contact with soil now or in the past should meet all the following criteria:

(1) A minimum of two soil samples should be collected to detect surface contamination around the base of each tank and should include expected areas of contamination based on soil discoloration/odors, history of repairs/replacement, soil beneath valves, or low areas where spills or leaks from valves may accumulate. Additional samples should be around larger tanks to ensure that there is at least one sample per 100 linear feet (from a depth of at least 6 inches, if VOCs were stored) of tank perimeter (circumference).

(2) Unless the tank has always been in compliance with NYCRR Part 614 or 599, at least one boring should be located adjacent to or within two feet of the tank and continuous two foot split spoon sampling performed to four feet below the current water table, or beyond where appropriate. The sample in each boring evidencing the highest apparent contamination based on soil discoloration, odor, field screening result or other field indicator should be laboratory analyzed.

(3) If there is no evidence of soil contamination, a groundwater sample should be collected from the zero to one foot interval below the current water table elevation. The sample should be collected within five feet of the tank on the expected downgradient side. It should then be analyzed following an appropriate laboratory method.

ii. Elevated tanks (that is, shell or bottom not in contact with ground) require soil sampling when there is any physical or documentary evidence of discharges, when soil discoloration is observed or when field monitoring or other evidence indicates that a discharge has occurred.

(1) At least one soil sample should be taken below tanks which store or may have stored hazardous substances, hazardous wastes, or petroleum products that do not cause obvious soil discoloration (such as volatile organics), in the area most likely to be contaminated, including without limitation, valve or former leak or rupture areas. If samples cannot be obtained from below the tank because soils are not accessible to sampling equipment, the sample may be located within two feet of the tank.

2. For aboveground tanks over unbroken paved surfaces:

i. Soil around aboveground tanks on paved surfaces should be sampled pursuant to (b)1 below (Pads) if there are stained soils adjacent to pad or if the potential contaminant would not cause discoloration (volatile organics), or if there is a history of spillage or other evidence that a discharge has occurred.

ii. Tanks within a paved containment area should be sampled at the drainage discharge point, if one exists, pursuant to (d) below (Drainage Areas).

iii. Soil sampling below the pavement should be conducted when the pavement has deteriorated so as to allow potential contaminant contact with the soil, or if there is reason to believe that pavement was not present over the life of the tank or former tanks.

iv. Instead of sampling soil beneath pavement, samples around the pad may be taken pursuant to (b)1 below, subject to the DER's review of documentation pursuant to section 1.6(c) specifying why boring through pavement was not considered practical (for example, concrete slabs with berms, synthetic liners)

3. For underground storage tanks :

i. Underground storage tanks (USTs) and distribution systems containing potential contaminants should be evaluated to identify any past or present discharges. All USTs must be in compliance with applicable regulations, upgraded as necessary or closed in accordance with the requirements of section 5.5(b). All USTs not being closed should be evaluated following this section.

(1) At least four soil samples should be collected from around each tank. The soil samples should be collected within two feet of the tank with one sampling location located at each end, and additional sampling locations located along the length of the entire tank pursuant to (a)3i(2) below;

(A) If sampling within two feet of the tank is not possible due to the presence of bedding gravel, or there are safety considerations (such as danger of tank puncture), which have been identified through field investigations or review of as built plans, soil samples should be taken as close as possible to the tank. However, no samples should be collected from further than five feet from the tank and a groundwater sample should be collected within five feet and downgradient of the tank.

(B) If, because of safety considerations, the distance between adjacent tanks precludes locating soil samples between the tanks, a groundwater sample may be collected within five feet and downgradient of the tanks, at the appropriate depth in lieu of the required soil samples between the tanks;

(2) The total number of required sampling locations per tank are as follows:

Total Tank Capacity (Gallons)	Approximate Tank Length (Feet)	Minimum Number of Sampling Locations
56-2,000	to 10'	4
2,001-10,000	to 30'	6
10,001-25,000	to 40'	8
25,000+	to 40'+	10

(3) Soil samples collected for analysis should be taken at zero to two feet below the tank bottom unless the tank is within the saturated zone (see (4) below);

(4) For underground storage tanks (USTs) within the saturated zone based on site specific water levels:

(A) If the contents of the UST being evaluated have ever had a density less than water, a soil sample should be collected from one foot above to one foot below the current water table surface. A groundwater sample should also be collected at the appropriate depth pursuant to section 3.7.1 (c) through (e); To verify tank

contents for out of service tanks, one sample should be taken of any product or residue remaining in the tank and analyzed using an appropriate fingerprinting or other analytical method.

(B) If the contents of the UST being evaluated have ever had a density greater than water, a soil sample should be collected from zero to two feet below the bottom of the tank. A groundwater sample should also be collected at the appropriate depth pursuant to section 3.7.1 (c). To verify tank contents for out of service tanks, one sample should be taken of any product or residue remaining in the tank and analyzed using an appropriate fingerprinting or other analytical method.

4. For all above grade piping:

i. Sampling is necessary if there is evidence of a discharge (for example, discolored soil, etc.) or reports of past discharges.

ii. Any sampling conducted should be pursuant to (e) below (Discharge/Disposal Areas).

5. For all below grade piping:

i. Below grade piping should be evaluated to identify any past or present discharges using soil samples located zero to six inches below the piping and within two feet of piping.

ii. For total piping length of one to 15 feet, a minimum of one soil sample should be collected. An additional soil sample should be collected for each additional 20 linear feet of piping or portion thereof from 16 to 50 feet of piping length. Sampling locations should be biased to include joints, dispensers, and other potential discharge areas.

iii. Piping runs within two feet of another pipe run may be considered a single pipe run. Soil samples for multiple pipe lines should be collected midway between/among the lines, or biased toward any pipe for which evidence of a discharge exists. For pipes that are separated by a distance greater than 2 feet vertically, soil samples should be collected below each pipe, pursuant to (a)5i above.

iv. For total piping lengths in excess of 50 feet, sampling frequency may be reduced subject to the DER's review of documentation pursuant to section 1.6(c) specifying why the reduced number was considered adequate.

6. For all loading and unloading areas:

i. Exposed soils at loading or unloading areas associated with tanks should be sampled at a minimum rate of one sample per fill connection or valved discharge point;

ii. For loading or unloading points located over impervious cover, sampling should be conducted pursuant to (b)1 below (Pads).

(b) The field investigation should also satisfy the following requirements for all storage and staging areas, dumpsters and transformers, whether temporary or permanent, including exposed soil areas adjacent to aboveground vessels on pads; tank loading/unloading areas on pads; dumpster staging areas; electrical transformers, heat exchanger and other outdoor equipment and drum storage pads.

1. For all pads:

i. Pads should have a minimum of one sampling location per side adjacent to exposed soil for sides up to 30 feet long; for sides greater than 30 feet long, one additional sample location is required for each additional 30 feet of length;

ii. Each sampling point should be located immediately adjacent to the pad and biased toward the suspected location of greatest contamination;

iii. If a pad shows evidence of deterioration that may allow contaminant contact with the soil, or its surface has been modified (repaved), or aerial photographs or site history indicate potential for previous discharges to the soil, soil samples beneath the pad should be collected pursuant to (b)2ii below; and

iv. Bermed pads and pads surrounded by impermeable cover should be sampled at any drainage discharge point pursuant to (d) below (Drainage Areas).

2. For all storage and staging areas over permeable cover:

i. Storage and staging areas with evidence of discharges which are or were used for storage of hazardous substances, hazardous wastes, or petroleum products should be sampled pursuant to (e) below (Spills/ Disposal Areas).

ii. Sample frequency should be one per 900 square feet of surface area to characterize soils below a storage or staging area up to 300 feet in perimeter with a minimum of one sample. Sample frequency may be reduced for larger areas subject to the DER's review of documentation pursuant to section 1.6(c) specifying why sample frequency was considered adequate. Sampling locations should be biased toward the suspected location of greatest contamination based on low points, drainage patterns, discoloration, stressed vegetation, field instrument measurements or other field indicators.

(c) The field investigation should satisfy the following requirements for all surface impoundments, including without limitation, lagoons, fire ponds, waste ponds or waste pits, storm water detention basins, excavations, natural depressions or diked areas, which are designed to hold an accumulation of liquid substances or substances containing free liquids. Active surface impoundments with impermeable liners which may be damaged as a result of sample collection should have liner integrity verified by physical inspection and/or evaluation of monitoring well water quality data associated with the surface impoundment, if available.

1. Sediments within all unlined surface impoundments should be sampled if the impoundment receives runoff from areas of potential contaminant sources;

2. Sediment sample locations should be biased towards inflow/outflow areas, and areas where sediments may be expected to accumulate;

3. Core samples should be taken for contaminant analysis and to fully characterize sediment type, thickness of sediment layers, and vertical extent of sediment.

4. Distinct layers of sediments thicker than six inches, as evidenced by color, particle size, or other physical characteristics, should be sampled individually.

5. Sediment quantity within the surface impoundment should be estimated.

(d) The site characterization or Remedial investigation should also satisfy the following requirements for all drainage systems.

1. For all floor drains and collection systems: if there is reason to believe contaminants were or may have been discharged into the floor drain or collection system:

i. The point of discharge for any floor drain or collection system should be sampled if the system discharges or ever may have discharged to soil, groundwater or surface water;

ii. If the point of discharge is unknown, tracer tests (for example, dye or smoke) should be conducted to determine the discharge point(s);

iii. Collection system integrity should be documented by representative soil sampling at potential leak areas, video inspection, hydrostatic test or pressure test. Other methods may be acceptable, subject to the DER's review

of documentation pursuant to section 1.6 (c) specifying why the methods were considered effective; and

iv. Sampling soil below floor drains, or collection system laterals should be conducted when corrosives (if plastic piping is or was used, organic solvents are considered corrosive) are or were discharged to floor drains or the collection system or there has been a history of collection system discharges, rupture or repairs. In such cases, representative soil sampling at known or suspected leak areas is required for potential contaminants.

2. Soil at each roof leader discharge point: should be sampled if storage units or process operations using hazardous substances, hazardous wastes, or petroleum products vent or may have vented to the roof;

3. For all swales and culverts:

i. Sampling should be conducted when the swale/culvert receives or received runoff from other contaminated areas of concern;

ii. Sediment and soil sampling should be conducted at the points where contamination from runoff/spills enter or have entered the drainage system; and

iii. If flow could have scoured sediments from the receiving structure, sampling should be conducted at on-site downgradient structures laden with sediments;

4. For all storm sewer and spill containment collection systems:

i. Sampling should be conducted when the collection system is or was the runoff/spill discharge point from other contaminated areas of concern;

ii. Sediment sampling should be conducted at the manhole, catch basin, sump, or other structure where contaminated runoff or discharges enter the drainage system;

iii. Sampling should be conducted in the soils around catch basins, manholes, sumps or other structures which contain or may have contained hazardous substances, hazardous wastes, or petroleum products, and are not hydraulically sound (that is, water percolates through the floor and walls), through the use of adjacent soil borings. A single boring located within two feet of the downstream side of the structure should be sampled at a depth corresponding to the bottom of the structure. If highly permeable soils are encountered and volatile organics sampling is required, sample at the next lower permeability soil horizon or zero to six inches above the saturated zone, or at 9.5 to 10 feet, whichever is encountered first; and

iv. Groundwater discharging from storm sewer systems which contain dry weather flow (that is, 5 days following the most recent rainfall) should be sampled at the discharge point and analyzed for potential contaminants discharged or potentially discharged into the system; and

5. For all boiler and compressor discharges: if there is reason to believe a potential contaminant discharge has occurred, sampling should be conducted pursuant to (e) below (Discharge/Waste Disposal Areas).

(e) The site characterization or remedial investigation should also satisfy the following requirements for all discharge and waste disposal systems and areas.

1. For any discharge areas and areas of discolored soil or stressed vegetation: where specific requirements are not otherwise provided in this section;

i. Each distinct area should be evaluated independently as an area of concern; and

ii. Initial characterization samples should be biased based on field indicators such as soil discoloration, stressed vegetation, or field instrument measurements toward those areas of greatest suspected contamination. Sample frequency should be at least 1 sample for every 900 square feet for areas up to 300 feet in perimeter.

Sample frequency may be reduced for larger area, subject to the DER's review of documentation pursuant to section 1.6(c) specifying why the reduced sample frequency was considered adequate.

2. Aboveground treatment systems: should be sampled pursuant to the requirements for the functional portions of the system pursuant to (a) above (Tanks). For example, any aboveground waste treatment tanks over unpaved soil should be sampled pursuant to (a)1 above.

3. For below grade wastewater treatment systems:

i. For tanks, septic tanks, separators, and neutralization pits: two samples should be collected from within the tank, one aqueous and one sludge sample, for analysis unless documentation acceptable to the DER pursuant to section 1.6(c) is provided in the site characterization report (section 3.13) specifying why such sampling was not considered necessary to confirm that only sanitary waste was discharged to the system during the entire life of the system. Documentation should include, without limitation, an affidavit certifying that only sanitary waste was ever discharged to the system and that no present or former floor drains, sinks, or other units in process areas were ever connected to the system.

ii. For septic disposal fields:

(1) Soil borings and/or test pitting should be completed as specified below for on-site disposal fields unless documentation acceptable to the DER is provided in the site characterization why soil borings were not considered necessary to confirm that only sanitary waste was discharged to the system pursuant to (e)3i above.

(2) At least one boring or test pit per 500 square feet of field area should be completed, with a minimum of four borings per field.

(3) Borings should be located within two feet of the edge of the bed area in active fields, but should be angled so that samples are taken below the infiltrative surface, and directly below laterals within abandoned fields.

(4) Borings should be located to include the first five feet of the infiltrative surface and should be spaced so that samples are representative of the entire disposal field.

(5) Soil samples should be taken at a depth corresponding to zero to six inches below the bottom of the infiltrative surface.

iii. For cesspools, seepage pits and dry wells:

(1) Sampling should be conducted in accordance with (2) through (5) below, unless documentation acceptable to the DER is provided in the site characterization report specifying why sampling was not considered necessary, for example, to confirm that only sanitary waste or storm water was discharged to the system pursuant to (e)3.i above;

(2) One representative sample of sludge/sediment in each pit should be obtained for laboratory analysis;

(3) A soil boring should be placed within the well, pit, or pool or, if not possible within two feet of the suspected downgradient side of the pit and should extend to a minimum of two feet below the pit bottom. The soil should be cored and inspected for evidence of discharge and samples collected in accordance with section 3.2.1(d)1 and 2. If warranted, samples obtained for volatile organics analysis should be collected as follows:

(A) Each core should be field screened with a properly calibrated photoionization detector or flame ionization detector (PID/FID) or other suitable instrument pursuant to section 2.1(f);

(B) If field measurement readings are detected above background, coring should be extended until background readings are achieved, or groundwater or bedrock is encountered;

(C) An undisturbed sample from the two foot interval registering the highest field measurement reading should be collected and analyzed for volatile organics;

(4) If the pit bottom is within two feet of the saturated zone or bedrock, a groundwater sample will be obtained within the pit or, if not possible, within two feet of the suspected downgradient side of the pit; and

(5) At a minimum, the laboratory analysis should target the contaminants suspected to have been discharged to the seepage pit.

iv. Collection lines: should be sampled pursuant to (d)1 above (Floor Drains).

(f) The characterization or remedial investigation should also satisfy the following requirements for any other potentially contaminated areas away from process areas not otherwise addressed pursuant to (a) through (e) above:

1. The sample locations should be biased toward suspected areas of the greatest contamination. If there is no basis for biasing, then random sampling of these areas is required as follows, except as provided in (f)2 below:

i. The area to be sampled should be gridded and each grid node given an identification number;

ii. The grid nodes chosen for sampling should be based on the numbers selected from a random number chart;

iii. Areas of less than 10 acres should be sampled at a rate of at least one sample for every two acres; and

iv. Areas greater than 10 acres may be sampled at a reduced frequency subject to the DER's review of documentation pursuant to section 1.6(c) specifying why a reduced frequency was considered appropriate, but a minimum of five locations should be sampled.

2. If the person responsible for conducting the investigation documents, pursuant to 1.6(c), that the area is not and has not been used for any purpose which may have included storage, transport or management of hazardous substances, hazardous wastes, or petroleum products, including, without limitation, the activities described in (a) through (e) above, then no samples are required. Such documentation should be based upon the following:

i. An aerial photographic history pursuant to Appendix 3A; and

ii. An affidavit signed by the person certifying the site characterization attesting that, based on diligent inquiry, no potential contaminants were discharged in the area.

3.10 Fish and wildlife resources impact analysis

3.10.1 Part 1: Resource characterization

(a) The purpose of the Fish and Wildlife Resources Impact Analysis (FWRIA) Part 1: Resource characterization is to identify actual or potential impacts to fish and wildlife resources from site contaminants of ecological concern, as defined in section 1.3.

(b) Follow Appendix 3C FWRIA decision key to determine if a FWRIA is needed. If there is any doubt, section 3.10.1(c) should be completed. Documentation supporting the decision to eliminate the FWIRA should be provided. If at a later time during the field characterization or remedial investigation, new information indicates the potential for adverse impacts to fish and wildlife resources, sections 3.10(c)(1) through 3.10(c)(5) should be completed. Under the following conditions, no FWRIA is needed:

1. There are no fish and wildlife resources, as defined in section 1.3, on or adjacent to the site or area of concern and the absence of resources is not due to contamination at the site; or

2. There are no ecological exposure pathways on or off the site or area of concern; or

3. The remediation is directed toward a specific discharge or spill event that does not adversely impact fish and wildlife resources;

4. The site is an underground tank or underground tank system; or

5. The site or area of concern is a point source of contamination to the groundwater (i.e. dry cleaner or gas station) which will be prevented from discharging to surface water, and there is no widespread soil contamination or habitat of an endangered, threatened, or special concern species present.

(c) A resource characterization consists of the following five steps which should be conducted by a qualified biologist, ecologist or other professional experienced in habitat assessment and assessment of contaminant impacts. (For CERCLA and NPL sites, a USEPA Ecological Risk Assessment may also be required.):

1. Identify fish and wildlife resources based upon knowledge of the site and a search of Department records and/or other sources. If no resources are identified on the site or adjacent to or downgradient from the site or area of concern, no further work on the FWRIA is required. Any resources identified should be indicated on a site map. The base map may be derived from such sources as aerial photos, ground-level photos, USGS topographic maps or soils maps. Maps should be drawn to a scale that allows features to be easily discerned. The following site maps should be provided:

i. A topographic map showing fish and wildlife resources within one-half mile of the site including habitats and habitats supporting threatened and endangered species, NYS regulated wetlands, wild, scenic and recreational rivers, significant coastal fish and wildlife habitats, streams and lakes; and

ii. A generalized cover type map for the area within one-half mile of the site showing any terrestrial, marine or freshwater habitat, such as woodlands, fields, wetlands (tidal, freshwater),shellfish beds, weed beds, NYS significant habitats and any rare NYS ecological communities.

iii. If no resources are identified on, adjacent to or downgradient of the site or area of concern, no further work on the ecological evaluation is required.

2. Identify contaminant migration pathways and any fish and wildlife exposure pathways. If no exposure pathways are identified, no further work on the FWRIA is needed.

3. Describe the resources on the site and within one-half mile of the site. Much of the information required for the description of resources may be based upon existing knowledge of the site and a search of Department records or other sources. Field verification may be needed if the site is large or contains extensive resources. If resources that may be affected by site-related contaminants exist farther than one-half mile from the site, this information should also be provided. The description of the resources should include:

i. Description of cover types, typical vegetative species, rare or protected plants

ii. NYSDEC freshwater wetlands and stream classifications, and tidal wetland types;

iii. Typical fish and wildlife species to be expected for each cover type; as well as endangered, threatened, rare species or species of special concern;

iv. Observations of stress including leachate or other seeps, exposed waste, absence of biota, dead or dying vegetation;

v. Recorded fish kills or other instances of wildlife mortality associated with the site;

vi. Existing fish or wildlife consumption advisories;

vii. A qualitative assessment of the general ability of the area to support fish and wildlife;

vii. The current and potential value of the resource to humans including hunting, fishing, wildlife observation, scientific research and other recreational or economic activities.

4. Identify contaminants of ecological concern. Before proceeding with this step, refer to the definition in section 1.3. Persistent and/or bioaccumulable compounds are contaminants of concern due to potential aquatic, marine or terrestrial food chain impacts. Identify all such contaminants.

i. Compare site contaminants to SCGs for protection of biota in each media of concern (surface water, sediments, soil or biota). If SCGs do not exist, criteria should be derived using methods established in SCGs such as 6 NYCRR Part 706 for surface water.

ii. For all other contaminants, including contaminants in soil, conduct a toxicity assessment. The toxicity assessment should be conducted using any applicable state or federal guidance and should be based on available scientific literature. The assessment should compare levels of site contaminants to the reference toxicity values developed. Contaminants with concentrations exceeding the reference toxicity values are considered contaminants of ecological concern.

5. Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern, draw conclusions regarding the actual or potential adverse impacts to fish and wildlife resources. If actual or potential adverse impacts are identified, a FWRIA Part 2: ecological impact assessment should be conducted according to section 3.10.2.

3.10.2 Part 2: Ecological impact assessment

(a) Complete a FWRIA resource characterization according to section 3.10.1 before proceeding with this section. If the results of the resource characterization indicate that further assessment is needed, an ecological impact assessment is required to further define and evaluate the adverse impacts to fish and wildlife resources.

(b) The ecological impact assessment should follow applicable state and federal guidance or scientific literature, and should be conducted by a qualified biologist, ecologist or other professional experienced in the techniques and methods for habitat characterization, biological sampling, and conducting ecological impacts analysis and/or ecological risk assessments.

(c) Conduct the following as appropriate for the contaminated media and contaminants of ecological concern:

1. Additional soil, sediment and/or surface water sampling to further delineate or characterize the contaminants of ecological concern identified in 3.10.1(c) 4.;

2. Use of passive in-situ concentration/extraction samplers (PISCES) to identify sources of organochlorine compounds with extremely low solubility in surface water;

3. Toxicity testing or bioassays of contaminated soils, sediments or surface water according to the latest EPA, ASTM or other approved methods for assessing acute and chronic effects;

4. Fish or other tissue sampling and analysis;

5. Terrestrial, aquatic or marine population and/or community assessment; and,

6. Other evaluations as required by the DER.

(d) Using the results of (c)1 through 6 above, conduct a detailed toxicity assessment incorporating information from section 3.10.1, and describe the actual or potential adverse impacts to fish and wildlife resources from the site.

(e) The results of the FWRIA should be reported as a separate section of the remedial investigation report. The

FWRIA should:

1. Incorporate the information and findings of the FWRIA Parts 1 and 2;

2. Develop appropriate ecologically-based, site specific cleanup objectives for site contaminants of ecological concern; and

3. Recommend measures for incorporation into the remedy selection report to eliminate or mitigate actual and potential adverse impacts.

3.11 Historic fill material

3.11.1 Characterization

(a) If historic fill material is present at the site, it may be assumed that the fill material is contaminated above an applicable unrestricted use SCG, and a remedial investigation of the historic fill material may be conducted pursuant to section 3.11.2 below.

(b) As an alternative to (a) above, if historic fill material is present at the site, it may be demonstrated that the historic fill material is not contaminated above the applicable unrestricted use SCGs on a case by case basis.

(c) An appropriate number of groundwater samples (minimum of one sample) are required when a high degree of certainty is needed to document that groundwater is not contaminated by the historic fill. All groundwater sampling should be conducted pursuant to section 3.7.1 (c).

3.11.2 Remedial investigation

(a) If historic fill areas are partly or totally within the site's boundaries, the Remedial investigation must include an evaluation of these historic fill areas as follows:

1. Remedial investigations should attempt to characterize the contents of the historic fill through a complete file review. In addition, the areal and vertical extent of historic fill material and its impact on the soil, groundwater, air and surface waters must be evaluated, including a determination of the presence of any contaminated non-historic fill material and any free product;

2. The Remedial investigation of historic fill material must identify the location, vertical limits, and physical characteristics of the historic fill material using borings, test pits, or trenches. If the contaminated fill material extends below the water table, borings or test pits should extend below the water table as necessary to establish the vertical limit of the fill material. All contaminated fill material, including both historic and non-historic fill, must be logged, and mapped. The areal boundaries of the contaminated fill material area should be delineated using test pits/trenches/borings at the edge of the fill. If fill material is known to be ubiquitous in the vicinity of the site, aerial photos or other applicable documentation may be submitted in lieu of perimeter borings or test pits to verify that historic fill is site-wide;

3. Delineation of historic fill material is not required beyond the property boundary;

4. The historic fill material may be characterized by collecting and analyzing contaminant characterization samples from each type of historic fill present to determine the site specific contaminant levels, as follows:

i. The actual number, location, and type of samples collected should be based on the variability of fill types, the size/area of fill, and the contaminant ranges present in a fill area;

ii. Unless all of the contaminants of concern are known, at least one sample for laboratory analysis should be collected from each boring and analyzed for priority pollutant metals in all samples. Field screening for volatile organic compounds must be conducted during the installation of all exploratory borings and test pits with

volatile organic laboratory analysis performed on all samples with elevated field instrument measurements (greater than five times background). Analysis for full EPA Target Compound List of volatile organic compounds (plus 10), semi-volatile organic compounds (plus 20), PCB/pesticides, and EPA Target Analyte List metals is required on 25 percent of the samples, biased to samples having the highest VOC screening level and/or visual discoloration. In addition samples must also be analyzed for any other contaminants of concern based on diligent inquiry of the origin of the fill material and site history; and

iii. Areas of concern, as defined in section 1, located in historic fill material should be investigated independently of the historic fill material. To differentiate between contaminants in fill and those caused by site discharges, an evaluation of the contaminant type and concentration gradient in each area of concern and the contaminant distribution in the fill should be conducted. If this evaluation is not conclusive the DER may require additional data or information;

iv. An appropriate number of groundwater samples are required to document whether groundwater is contaminated. Any groundwater sampling should follow the approach defined in section 3.7.

3.12 Records search report

(a) If no areas of concern are identified which require characterization or remedial investigation, the person responsible for conducting the investigation is to prepare a records search report which meets the following requirements. If areas of concern are identified which require further characterization or remedial investigation, a separate records search report need not be prepared, however, the information obtained pursuant to Appendix 3A (Records search requirements) should be incorporated into the site characterization report described in section 3.13 or the Remedial Investigation report described in section 3.14. The records search report should:

1. Present and discuss all of the information identified, evaluated or collected pursuant to section 3.1;

2. Be presented in a format that corresponds to the outline of Appendix 3A; and,

3. Include the following:

i. Scaled site plans detailing lot and block numbers, property and leasehold boundaries, construction or destruction of buildings, areas where fill or cover material has been brought on-site, paved and unpaved areas, vegetated and unvegetated areas, all areas of concern and active and inactive wells; and

ii. Scaled historical site plans and facility as-built construction drawings, if available;

iii. A copy of the United States Geologic Survey (USGS) 7.5 minute topographic quadrangle that includes the site and an area of at least a one mile radius around the site. This map should be the most recent USGS revision and should clearly note the facility location and property boundaries. When a portion of the USGS quadrangle is used, the scale, north arrow, contour interval, longitude and latitude, along with the name and date of the USGS quadrangle should be noted on the map; and

iv. A summary of the data and information evaluated in all phases of the work, as set forth in Appendix 3A, should be presented by area of concern.

4. For each area of concern identified at the site, which has not been remediated under DER oversight, the records search report should contain a recommendation that either:

i. One or more contaminants have been identified at the area of concern or are suspected of being present, the area of concern has not been previously remediated under DER oversight, and thus additional investigation or remediation is required; or

ii. The area of concern is not believed to contain contaminants pursuant to 3.1.1 (c), in which case the records search report should detail the basis for the recommendation, including references to all documentation

relied upon in making the recommendation.

(b) Upon written request of the person responsible for conducting the investigation and/ or remediation the DER will determine the extent to which prior submissions or completions may satisfy the specific items required for the records search report. If the DER approves any such prior work in writing, then that work may be included as part of the records search report.

3.13 Site characterization report

(a) The site characterization report should present and discuss all of the information identified or collected pursuant to 3.2.1 through 3.11.1.

(b) The site characterization report should include the following:

1. Historical information pursuant to section 3.12 unless the investigation is directed at either a specific discharge event, rather than a particular area of a site, or any underground tank or underground tank system;

2. A physical setting section which should include descriptions of the following unless the remediation is directed at either a specific discharge event, rather than a particular area of concern, or any underground tank or underground tank system:

i. The physical conditions of the site and surroundings, including a general description of soils, geology, hydrogeology, and topography; and

ii. Use of, distance to, flow direction, classification of and names of surface water bodies within one-half mile of the site with emphasis upon water bodies topographically or hydraulically downgradient of the site that may receive site discharges or runoff.

3. A technical overview which should present a general profile of the site characterization execution and results. The following items should be discussed in the technical overview:

i. Reliability of laboratory analytical data as indicated by compliance with sample holding times, ability to achieve method detection limits and precision and accuracy criteria for the analytical method, and other indicators of data quality;

ii. A summary of the overall nature of contamination on the site, including, without limitation, the numbers of areas of concern requiring further remediation; and

iii. Any significant events or seasonal variation which may have influenced sampling procedures or analytical results; and

4. Findings/recommendations which should include;

i. A discussion, by area of concern, of the site characterization execution and analytical results. The discussion should consist of specific findings at the areas of concern.

ii. A discussion of the following items, for each area of concern:

(1) A detailed description of each area of concern including dimensions, suspected and actual contamination, and suspected source of discharge;

(2) Results and implications of field measurements or area-specific changes in sampling protocol due to field conditions;

(3) Significance of information generated in the library search of tentatively identified

compounds/unknown compounds; and

(4) Recommendations for either additional remediation or no further remediation for each area of concern.

iii. A discussion of the results of the FWRIA part 1, pursuant to section 3.10.1 (c).

(c) The site characterization report should also include the following data and information:

1. Results of all analyses, copies of all laboratory data sheets and the required laboratory data deliverables pursuant to section 2.1 (Quality Assurance Requirements). Laboratory data deliverables may be submitted as a separate attachment;

2. A summary table of analytical methods and quality assurance indicators pursuant to section 2.2(a)5;

3. A table summarizing all sampling results, including sample location, media, sample depth, field and laboratory identification numbers, analytical results, and comparison to applicable SCGs organized by area of concern:

i. All contaminant concentrations exceeding the applicable SCGs should be identified;

ii. Samples with method detection limits (MDLs) (or practical quantitation levels (PQLs) if available) exceeding the applicable remediation standard should be identified and an explanation provided in the table key;

iii. Soils/solids sample results should be reported in milligrams per kilogram on a dry weight basis, and aqueous sample results should be reported in micrograms per liter;

iv. All groundwater data for the same aquifer zone should be located in the same section of the table.

v. A table which identifies all contaminants of ecological concern, applicable SCGs, any reference toxicity values developed during the toxicity assessment and representative concentrations of those contaminants at the site.

4. Stratigraphic logs, which include soil/rock physical characteristics and field instrument readings detected during drilling for each soil boring, test pit and monitoring well. In addition if sediment sampling was conducted, logs which describe grain size, color, cohesion, odor and stratigraphy, if any is evident, should be included;

5. Stratigraphic cross sections of the site using information from monitoring wells, test pits and borings, if available;

6. All soil boring, piezometer, and monitoring well records (including well development logs), including the State permit numbers and as-built specifications, if applicable;

7. The following information, where applicable, should be reported for each monitoring well sampled for each groundwater sampling event. All measurements should be to the nearest 0.01 feet:

i. Before purging:

(1) The date, time, and weather conditions;

(2) The well identification number;

(3) The photoionization detector (PID) and/or flame ionization detector (FID) reading taken from the well immediately after the cap is removed;

(4) The thickness of free product, if present;

(5) The pH, dissolved oxygen, temperature, and specific conductance;

(6) The total depth of the well from the top of casing or surveyors mark if present;

(7) The depth from the top of the casing to the water; and

(8) The estimated water volume in the well.

ii. After purging:

(1) The start and end time for purging;

(2) The purge method;

(3) The purge rate(s);

(4) The total volume purged;

(5) The depth from the top of the casing to the water after purging; and

(6) pH, dissolved oxygen, temperature, and specific conductance.

iii. Before sampling:

(1) The depth from the top of the casing to the water before sampling.

iv. After sampling:

(1) The start and end time for sampling;

(2) The sampling method.

v. Any comments concerning field observations during the groundwater sampling event, such as slow recharge, turbidity, odor, sheen, PID and/or FID readings, model number and ionization potential of PID and/or FID used, should also be reported; and

8. Any other data and information obtained pursuant to sections 3.2.1 through 3.11.1.

(d) The site characterization report should also include the following legible maps and diagrams:

1. Site and area of concern base maps pursuant to section 3.12(a)3i and 3.10.1(c)1.

2. Sample location map(s), including:

i. All sample locations, sample depths and contaminant concentrations should also be plotted on the map. Where an entire contaminant class is not detected or is less than the applicable remediation standard, contaminants need not be listed individually;

ii. Map scale and orientation;

iii. Field identification numbers for all samples; and

iv. If more than one map is submitted, maps should be presented as overlays, keyed to the base map in

(d)1 above; sample locations may be superimposed on the site or area of concern map in (d)1 above. Alternatively, individual maps may be submitted which have a common coordinate system and common scale, provided each map details the features of the base map in (d)1, above.

3. If applicable, a map of the distribution of surface water, sediment, structure and airborne contaminants, including sample location numbers and contaminant concentrations; and

4. Photos may be submitted to document the location of all soil and sediment sample locations.

3.14 Remedial investigation report

(a) The Remedial investigation report must present and discuss any information collected under sections 3.1 through 3.11 and the approved remedial investigation workplan. The remedial investigation report will follow the format of this section and should include enough information to, at a minimum, address the following:

1. Identify and characterize the source(s) of contamination;

2. Describe the amount, concentration, environmental fate and transport (as necessary), phase (e.g., gas, solid, liquid), location, and other significant characteristics of the substance(s) present;

3. Define hydrogeological factors (as needed: grain size analysis, soil permeability, nature of bedrock (if applicable), depth to saturated zone, hydraulic gradients, proximity to a drinking water aquifer, surface water, floodplains, and wetlands);

4. Identify routes of exposure and human population(s) at risk, including sensitive receptors;

5. Identify actual or potential adverse impacts to fish and wildlife resources and to other environmental resources (mining, recreational etc.).

6. If present, identify surface water classifications and existing use designations;

(b) The remedial investigation report builds upon the information contained in the remedial investigation workplan developed in 3.3. The remedial investigation report must include the following:

1. All of the relevant information obtained under sections 3.3(b)3 and 4;

2. Technical overview and findings which present a description of the work done under the approved remedial investigation workplan and the results of that completed work. The technical overview and findings should include a discussion of the reliability/usability of laboratory analytical data, a summary of the overall nature and extent of contamination using the State standards, criteria, and guidance identified in section 3.2(e) for comparison, a summary of any ecological assessments conducted, and any significant events, observations, or seasonal variation which may have influenced sampling procedures or analytical results.

3. SCGs which pertain to the site location, site contaminants, and potential remedial actions must be identified and listed in the draft remedial investigation report. The remedial investigation should determine the extent to which SCGs have been exceeded or contravened.

4. All sampling results which exceed SCGs summarized in tables (organized by areas of concern) which include sample location, media sampled, sample depth, field/laboratory identification numbers, analytical results, and the applicable SCG for comparison. An entire set of summary sheets for all sampling results must be included as an appendix to the remedial investigation report. UTM coordinates (NAD 83) should be identified for each sample location;

5. Stratigraphic logs which include soil/rock physical descriptions, well installation details, well development data including volumes purged, and field instrument readings detected during drilling for each soil

boring, test pit and monitoring well;

6. If sufficient subsurface investigation was completed, stratigraphic cross sections of the site using information from monitoring wells, test pits, borings, geophysical data, or other historical information;

7. Site and area of concern base maps scaled at one inch to 200 feet or less (sample location maps may be keyed to and superimposed on base maps) and consist with the specifications for maps and diagrams included in section 3.13 (d);

8. Sample location maps, scaled at one inch to 40 feet or less, must include all groundwater, soil, sediments and other sample locations, surveyed in, with sample depth and contaminant concentrations indicated on the map, if possible;

9. Groundwater elevation contour maps with flow direction specified for each set of static water level measurements for each aquifer where monitoring wells/piezometers were installed for flow direction. Groundwater elevation, for each monitoring well/piezometer, must be to the nearest hundredth (0.01) foot relative to a permanent, on-site datum;

10. Top of bedrock contour map if bedrock was encountered in a sufficient number of borings to prepare a map;

11. At a minimum, site maps must show groundwater contaminant concentrations for each sampling round. Isopleth maps for groundwater contaminant concentrations for each round of sampling and isopleth maps for soil sample results may also be provided;

12. Maps depicting the areal and vertical (thickness) extent of any free product zones in groundwater or soil;

13. If completed during the investigation , results of any treatability, bench scale, or pilot studies or other data collected to support remedy selection. This would include documentation acceptable to the DER indicating that a groundwater model used to evaluate potential groundwater remedies was appropriate;

14. Any data collected to develop discharge limitations;

15. A Fish and Wildlife Resources Impact Analysis report documenting the results of the Resource Characterization and Ecological Impact Assessment, if required.

16. Any other pertinent data obtained from implementing the workplan, including any IRMs done prior to or during the remedial investigation .

17. A qualitative exposure assessment completed in accordance with Appendix 3B, which identifies areas of concern and compounds of concern, evaluates actual or potential exposure pathways, characterizes the potentially exposed receptors (residents, workers, recreational users, etc.), and identifies how any unacceptable exposure pathways might be eliminated/mitigated.

i. An exposure pathway is how an individual may come into contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

ii. The potentially exposed receptors and how any unacceptable exposure pathways may be eliminated are determined from an assessment of the primary use of the area (e.g. residential, industrial, or recreational), actual and potential use of ground and surface waters that are impacted or threatened, and how any potential routes of exposure may be eliminated. The reasonably anticipated future use of the area should be used in this assessment.

18. A quantitative risk assessment consistent with CERCLA may be included if the exposure assessment, described above, is not sufficient.

19. Conclusions and recommendations which summarize the extent of the areas of concern, identifies any unacceptable exposure pathways, and recommends any future work (e.g. none, additional investigation, or an evaluation of remedial alternatives). This should include an updated conceptual model of the site.

20. Submission of text, figures, maps and data in electronic format acceptable to the DER.

SECTION 4 REMEDY SELECTION

4.1 Remedial action goals, objectives and criteria

(a) The purpose of remedy selection is to identify and evaluate the most appropriate action for a particular contaminated site or area of concern being investigated pursuant to section 3 of this guidance.

(b) The remedial goal for all remedial actions undertaken pursuant to this guidance, with the exception of the voluntary cleanup program, will be the restoration of a site to pre-disposal/pre-release conditions, to the extent feasible and authorized by law. At a minimum, the remedy will eliminate or mitigate all significant threats to public health and the environment presented by the contaminants disposed at the site through the proper application of scientific and engineering principles. For the voluntary cleanup program, the goal will be to be protective of public health and the environment, given the intended use of the site. Further, where an identifiable source of contamination exists at a site, it should be removed or eliminated, to the extent feasible, regardless of presumed risk or intended use of the site.

(c) Remedial Action Objectives (RAOs) are medium-specific or operable-unit specific objectives for the protection of public health and the environment and are developed based on contaminant-specific SCGs. Appendix 4A provides examples of RAOs for various media. A person proposing a remedy at any site according to this guidance should first establish the RAOs for the site or area of concern by:

1. Identifying all contaminants exceeding applicable SCGs and the environmental media impacted by the contaminants;

2. Identifying applicable SCGs taking into consideration the current and, where applicable, future land use for the site;

3. Identifying all actual or potential public health and/or environmental exposures resulting from contaminants in environmental media at, or impacted by, the site ; and

4. Identifying any site-specific cleanup levels developed pursuant to section 3.10.2(e).

(d) The person responsible for conducting the investigation and/or remediation of a site should develop alternatives and propose a remedy that removes the contamination and/or reduces or eliminates exposure to the contaminants above the SCGs. At a minimum, this should include removal of the source of the contamination, including but not limited to, any free product and any grossly contaminated soils, to the extent technically and practically feasible, as determined by the DER.

(e) When proposing an appropriate remedy, the person responsible for conducting the investigation and/or remediation should identify and develop a remedial action that is based on the following criteria [Note: for the convenience of the regulated community, the criteria are set out utilizing the format of 40 CFR §300.40 and cross references to the comparable criteria at 6 NYCRR § 375-1.10 are provided]:

1. Overall Protection of Public Health and the Environment. This criterion is an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, engineering controls or institutional controls. The remedy's ability to achieve each of the RAOs is evaluated. [see 6 NYCRR § 375-1.10(c)(2)]

2. Compliance with Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance. All SCGs for the site will be listed along with a discussion of whether or not the remedy will achieve compliance. For those SCGs that will not be met, provide a discussion and evaluation of the impacts of each, and whether waivers are necessary. [see 6 NYCRR § 375-1.10(c)(1)]

3. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated:

i. The magnitude of the remaining risks (i.e. will there be any significant threats, exposure pathways, or risks to the community and environment from the remaining wastes or treated residuals?),

ii. The adequacy of the engineering and institutional controls intended to limit the risk,

iii. The reliability of these controls, and;

iv. The ability of the remedy to continue to meet RAOs in the future.
[see 6 NYCRR § 375-1.10(c)(4)]

4. Reduction of Toxicity, Mobility or Volume with Treatment. The remedy's ability to reduce the toxicity, mobility or volume of site contamination is evaluated. Preference should be given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site. [see 6 NYCRR § 375-1.10(c)(5)]

5. Short-term Effectiveness. The potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during the construction and/or implementation are evaluated. A discussion of how the identified adverse impacts and health risks to the community or workers at the site will be controlled, and the effectiveness of the controls, should be presented. Provide a discussion of engineering controls that will be used to mitigate short term impacts (i.e. dust control measures). The length of time needed to achieve the remedial objectives is also estimated. [see 6 NYCRR § 375-1.10(c)(3)]

6. Implementability. The technical and administrative feasibility of implementing the remedy is evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc. [see 6 NYCRR § 375-1.10(c)(6)]

7. Cost. Capital, operation, maintenance and monitoring costs are estimated for the remedy and presented on a present worth basis. [see 6 NYCRR § 375-1.10(c)(6)]

8. Community Acceptance. Provide a summary of the public participation program that was followed for the project, see section 1.10 for requirements. The public's comments, concerns and overall perception of the remedy are evaluated in a format that responds to all questions that are raised (i.e. responsiveness summary). [see 6 NYCRR § 375-1.10(c)(7)]

4.2 Development and evaluation of alternatives

(a) The following are the main steps in the decision-making process for remedy selection in the applicable programs pursuant to Section 1.2 of this guidance :

1. Establish the remedial goals for the applicable program pursuant to section 4.1 (b) of this document.

2. Establish RAOs pursuant to Section 4.1 (c) of this document.

3. Identify general response actions including an estimate of the volumes/areas of contaminated media. General response actions include non-technology specific categories such as treatment, containment, excavation, extraction, disposal, institutional controls or a combination of these. Where presumptive remedies are available to address the contamination identified, they should be strongly considered (but not to the exclusion of innovative technologies). If a presumptive remedies are applicable, pursuant to current EPA or DER guidance, the remedy selection process may skip this step (with the exception of estimating volumes/areas of contaminated media) and

proceed directly to section 4.2 (a)5. All applicable general response actions should be developed on a medium-specific basis, similar to the development of RAOs. For each medium addressed the volumes or areas to be remediated should be identified and characterized with respect to requirements for protectiveness, taking into account the chemical and geologic characterization of the site or operable unit. During this step technologies which are not appropriate for the site due to site specific factors or constraints should be eliminated from further consideration, with a discussion of the site-specific reasons as appropriate. See Appendix 4A for examples of potential general response actions.

4. Identify and Screen Technologies. In this step of the process, technology types (i.e. general categories such as chemical treatment, enhanced biodegradation, thermal destruction, immobilization, capping, dewatering, etc.) appropriate to the site-specific conditions and contamination are identified for each of the general response actions identified above. The technology process options that correspond with the technology types (i.e. chemical treatment would have precipitation, ion exchange, oxidation/reduction and others as technology process options) are also identified at this time. These technologies are then screened, on a medium-specific basis, to identify those that are technically implementable for the site and can meet the site RAOs. Additional information (i.e. site characterization data, pilot tests) may be required to adequately evaluate alternatives and technologies being considered. Those that are not technically implementable are dropped from further consideration. Those that remain are used in the next step to assemble alternatives.

5. Assemble technologies into operable unit and/or site-wide alternative(s). In this step, the potential technologies are assembled into media-specific or site-wide remedial alternatives. The identified alternatives should be developed and defined to a level of detail that will allow for the estimation of the alternative's cost and for the subsequent detailed analysis of alternatives.

i. Each alternative should be defined with respect to:

(1) Size and configuration of process options;
(2) Time for remediation;
(3) Spatial requirements;
(4) Options for disposal;
(5) Substantive technical permit requirements (see definition section 1.3);
(6) Limitations or other factors necessary to evaluate the alternatives, and;
(7) Beneficial and/or adverse impacts on fish and wildlife resources. Refer to Appendix 4B FWRIA Part 3 Ecological Effects of Remedial Alternatives.

ii. Specific alternatives which must be evaluated include a "no-action" alternative and an alternative which would restore the site to "pre-disposal conditions." Other alternatives to be considered when evaluating alternatives, in accordance with the remedy selection reports described in section 4.3 (b) - (d), include those based on:

(1) Current, intended and reasonably anticipated future use of the site;

(2) Removal of source areas of contamination, and;

(3) Containment of contamination.

6. Analyze the alternative(s) pursuant to the criteria in section 4.1 (d) . In this step, each of the identified alternatives is evaluated against the first seven (7) evaluation criteria noted in section 4.1 (d). Also, as part of this step, where more than one alternative is developed, a comparative analysis of each alternative to the other alternatives using the same 7 criteria is conducted. The eighth criteria, Community Acceptance of the remedy is evaluated after the public comment period, where applicable.

7. Before proposing an appropriate remedy consider the potential for a natural resource damage (NRD) claim by identifying any natural resource injury resulting from contamination at the site and the extent to which the selected remedy eliminates the injury. Refer to Appendix 4C, Natural Resources Damages Checklist, which

identifies the type of information used by the Department to decide whether an NRD claim should be considered. If the Appendix 4C evaluation indicates a significant impact to resources, consult with the NYSDEC project manager.

8. Recommend a remedy for the site. This final step in the process will identify the recommended remedy and summarize the reasons why, with reference to the criteria in section 4.1 (d), it is the best alternative for the remediation of the site, area of concern or operable unit.

4.3 Remedy selection reporting requirements

(a) The procedures and requirements that follow are the remedial selection reporting requirements for the applicable programs identified in section 1.2 of this guidance. The purposes of the reports outlined below are to develop alternative remedies for a site, evaluate the alternatives based on the criteria presented in Section 4.1 (d) above and to make a recommendation for an appropriate final remedy. The reporting requirements for each program are:

1. For the State Superfund program, a feasibility study (FS) report in accordance with the requirements of section 4.3 (b).

2. For the Brownfield program a remedial alternatives report (RAR) in accordance with the requirements of section 4.3(c).

3. For the Voluntary Cleanup program: a remedial action selection (RAS) report in accordance with the requirements of section 4.3 (d).

4. For a long term spill response, a RAS report in accordance with the requirements of section 4.3(d).

(b) The FS is a study undertaken to develop and evaluate options for remedial action. The feasibility study emphasizes data analysis and is generally performed concurrently and in an interactive fashion with the remedial investigation, using data gathered during the remedial investigation. The remedial investigation data are used to define the objectives of the program, to develop remedial action alternatives, and to undertake an initial screening and detailed analysis of the alternatives. The term also refers to the report that describes the results of the study. The FS report must identify the goal of the remedial program and develop the RAOs for the site as detailed in section 4.1 (b) and 4.1 (c). The FS must also document and provide sufficient detail to support the decision-making process for the selection of a remedy for each of the steps outlined in section 4.2 (a) 1-7. The FS report should include the following sections:

1. Executive summary
2. Purpose
3. Site description and history
4. Summary of remedial investigation and exposure/risk assessment
5. Remedial goals and remedial action objectives
6. General response actions
7. Identification and screening of technologies
8. Development and analysis of alternatives
    i. Assemble technologies into alternatives

ii. Evaluation of alternatives with respect to the first seven criteria

9. Recommended remedy and why it was selected

(c) The RAR is required for the environmental restoration (Brownfields) program and is to be prepared by the municipality, pursuant to a State assistance contract, according to this sub-section. The RAR report must identify the goal of the remedial program and develop the RAOs for the site as detailed in section 4.1 (b) and 4.1 (c). The RAR will then utilize the decision-making process outlined in section 4.2 (a) 1-7, however the RAR report is only required to document and provide sufficient detail to support the decision-making process for the steps detailed in sections 4.2 (a) 5-7. The RAR report should include the following sections:

1. Executive summary
2. Purpose
3. Site description and history
4. Summary of remedial investigation and exposure/risk assessment
5. Remedial goals and remedial action objectives
6. Development and analysis of alternatives
   i. Assemble technologies into alternatives
   ii. Evaluation of alternatives with respect to the first seven criteria
7. Recommended remedy and why it was selected

(d) The RAS report is to be prepared by the person responsible for conducting either a voluntary cleanup or long term spill response. The RAS will be submitted to the DER for approval prior to implementation of the remedy, to demonstrate to the DER that the proposed remedy is appropriate to address the contamination identified at the site or area of concern which is being addressed by the voluntary cleanup or spill remediation. The RAS report must identify the goal of the remedial program and develop the RAOs for the site as detailed in section 4.1 (b) and 4.1 (c). The RAS should then utilize the decision-making process outlined in section 4.2 1-7, however the RAS report is only required to document the selected remedy's compliance with the eight criteria identified in section 4.1 (e). The RAS report should be an engineering report containing the above information, plus a detailed description (engineered conceptual model) of the proposed remedy along with a demonstration that the remedy can achieve the cleanup goals for the site or area of concern. The RAS report should include the following sections:

1. Purpose
2. Site description and history
3. Summary of remedial investigation
4. Remedial goals and remedial action objectives
5. Recommended remedy and why it was selected
   i. Detailed description of remedy
   ii. Consideration of the first seven criteria and the remedial action objectives

4.4 Remedy selection decision documentation

(a) Upon review and acceptance of the remedy selection report for the site or area of concern being investigated pursuant to section 3 of this guidance, the DER will issue the following agency decision documents:

1. For State superfund and Brownfields remedies, a Proposed Remedial Action Plan (PRAP) which identifies the preferred remedy, summarizes the alternatives considered and discusses the reasons for proposing the preferred remedy will be prepared by the DER. The PRAP will be subject to a public comment period (30 days for State superfund and 45 days for Brownfields) after which the DER will prepare a Record of Decision (ROD) identifying the selected remedy, which will include a responsiveness summary to public comments and concerns raised during the public comment period.

2. For Voluntary Cleanup Program remedies, the RAS report describing the proposed remedy, will be publicly noticed in the Environmental Notice Bulletin and subject to public comment.

3. For long term spill response remedies, the DER will issue an approval letter for the remedial action workplan/engineering report that describes the remedy.

SECTION 5. REMEDIAL DESIGN/REMEDIAL ACTION

5.1 General requirements

(a) This section provides the general guidance for designing and implementing remedial actions or IRMs at any site that is the subject of an oversight document pursuant to section 1.2 (b) and for performing any underground storage tank removal, whether or not an oversight document is in place, pursuant to section 1.2 (b)1.iv.(1). Included in this section is guidance for:

1. The formal design of a site remedy pursuant to section 5.2;

2. The preparation of a remedial action workplan in cases where the DER agrees a formal design is not necessary, in accordance with section 5.3;

3. Remedial action compliance, in accordance with Section 5.4;

4. Underground storage tank closure, in accordance with Section 5.5;

5. Institutional controls will be required whenever engineering controls are a component of a site remedy selected pursuant to section 4, however institutional controls may also be required where no engineering controls are needed. Institutional control implementation is discussed in Section 5.6;

6. The reporting requirements for the above are detailed in sections 5.7 and 5.8

(b) The person responsible for conducting the remediation, in addition to providing any notice detailed in section 1, should notify the DER at least 5 days before:

1. Initiating any remedial action for which DER oversight is to be provided, or

2. Initiating an underground storage tank closure, in accordance with section 5.5.

(c) Each remedial design/remedial action is to:

1. Be approved by the DER prior to implementation if a remedy is selected pursuant to section 4.4. Workplans for design and construction should be provided in accordance with Section 5.2 and 5.3.

2. Comply with all applicable SCGs in effect at the time of any remedial action workplan approval by the DER;

3. Comply with all applicable Federal, State, and local laws, regulations, and requirements;

4. Not result in an uncontrolled, or unapproved discharge or transfer of contaminants from one media to another;

5. Where engineering or institutional controls have been implemented, the controls are to be evaluated by the person responsible for conducting the remediation, at a frequency determined by the DER, in accordance with an approved operation, maintenance and monitoring (OM&M) plan developed for the site in accordance with section 6;

6. Comply with the remedy selected in the DER decision document;

7. Include a health and safety plan as specified by section 1.9;

8. Include provision to obtain site access and any required permits; and

9. Provide the remedial design/remedial action documents detailed below in accordance with the certification provision in section 1.5.

(d) Expedited remediations may be acceptable as IRMs pursuant to section 1.11, where the remedial action is conducted concurrently with sampling to delineate the contamination and to confirm contaminant removal.

(e) Free product determined to be present is to be treated or removed when practicable, or contained when treatment or removal are not practicable. Decisions regarding the practicability of addressing the above will be made by the DER on a case by case basis.

(f) For sites or areas of concern where fish and wildlife resources have been identified according to section 3.10, the remedial design or remedial action workplan developed according to sections 5.2. or 5.3 must include appropriate measures for delineating and protecting the identified resource and for monitoring construction related impacts. The steps necessary to comply with this requirement are collectively identified as a FWRIA Part 3: resource considerations for design and construction, which includes the following:

1. Any significant resources identified by the FWRIA part 1 (section 3.10.1), which will be impacted during remediation, should be delineated in the field and shown on the RD/RA construction drawings. The NYSDEC regional Division of Fish Wildlife and Marine Resources (DFWMR) and/or the NYS Natural Heritage Program should be contacted to arrange for the following delineations:

i. For NYS regulated wetlands, a wetland field delineation may be required as part of the design development in order to provide a reference for restoration and/or mitigation of wetlands disturbed or filled in as part of the remedial action.

ii. For endangered, threatened or special concern species or their habitat and rare ecological communities, the RD/RA should avoid incidental or construction related impacts to these resources.

2. At a minimum, the RD/RA must meet the substantive technical requirements of applicable resource-related permits (e.g. 6 NYCRR Parts 608, 661, 663). Where resources are impacted during remediation or if loss of wetlands or other significant resources is unavoidable, specifications for resource restoration and/or mitigation should be included in the RD/RA.

3. The RD/RA should identify procedures for protection of seasonal fish and wildlife resources such as construction windows to avoid fish spawning, bird nesting, animal migrations etc.

4. A plan for any required post-remedial resource monitoring should be developed during the remedial design and included in the OM&M manual developed according to section 6. Any required baseline monitoring of the site and/or reference locations should be completed prior to the start of construction activities on site.

5. All resource related restrictions, restorations and erosion control or other protective measures should be included on the construction drawings.

6. Construction related impacts should be monitored during implementation of the remedy according to the specifications and procedures contained in the RD/RA workplan. As applicable, construction monitoring should include:

i. Implementation of soil and sediment erosion and storm water management and monitoring procedures developed in accordance with section 5.2 or 5.3 to ensure protection of terrestrial, aquatic and marine habitats potentially affected by runoff or discharge from the construction area;

ii. Surface water monitoring for turbidity, particulates, sheens and contaminants of concern, including use of passive in-situ contaminant extraction samplers (PISCES) or semi-permeable membrane devices (SPMDs);

iii. Monitoring water levels and/or vegetation in wetlands or water bodies affected by water management

activities such as temporary dewatering facilities;

iv. Periodic observation of behavior or health of endangered, threatened or special concern species or rare ecological communities; and

v. Use of caged fish or other organisms to monitor contaminant uptake or toxicity during dredging or other construction activities.

5.2 Remedial design

(a) If a formal remedial design is required by the DER or if the person responsible for conducting the remediation elects to perform a remedial design, a remedial design (RD) workplan should be submitted in accordance with the schedule contained in the oversight document. The RD workplan, in addition to the requirements of (b) below, should detail the documents to be prepared as part of the design and provide a schedule for their submittal. If a formal remedial design is not required or proposed, proceed directly to section 5.3.

(b) The RD workplan should be in a format that corresponds directly to the following outline and include:

1. The remedial investigation report, pursuant to section 3.14, should be presented as the first section of the remedial design workplan. If the remedial investigation report was previously submitted to the DER, either a summary of the report or a copy of the DER's decision document may be submitted;

2. A summary table of sampling results for samples collected prior to remediation;

3. The identification of all SCGs;

4. A detailed description of the remedial action and the remedial technology to be conducted for each area of concern;

5. A scaled site map pursuant to section 3.14, identifying all areas where the remedial action will be conducted. In addition, the map should specify, as appropriate:

i. The location of remedial treatment units;

ii. The volume of each environmental medium to be remediated;

iii. The vertical and horizontal extent of area to be remediated;

iv. The location, depth and concentration of all contaminants in excess of the remediation standard;

v. Sample locations, depths and parameters for all post-construction samples; and

vi. Wetlands, streams or other habitats potentially impacted by the remedial action.

6. A QAPP including proposed sampling and analytical methods pursuant to section 2.2;

7. A list of all required permits and/or substantive permit requirements (see section 7.3 and Appendix 7B);

8. An outline for the OM&M plan, to be developed in accordance with section 6. This should include a schedule for the submittal of the final OM&M plan, which takes into account the proposed initiation of any portion of the remedy subject to the OM&M plan.

(c) A formal remedial design should incorporate all of the elements identified for the workplan into a set of biddable quality plans and specifications. In addition to the workplan, the submittals for a remedial design typically include:

1. A preliminary design which is submitted at the 50-75% completion level. The appropriate completion level for the submittal is determined based upon the complexity of the project;

2. A 95% completion submittal of the design plans and specifications; and

3. A final design submittal of the plans and specifications which is signed and stamped by a professional engineer licensed to practice in NYS.

5.3 Remedial action workplan

(a) If a remedial action (RA) workplan is required by the DER in an oversight document or if the person responsible for conducting the remediation elects to obtain DER pre-approval for the work to be performed, a workplan should be submitted. The RA workplan should be in a format that corresponds directly to the outline of (b) below, and be provided in accordance with the schedule contained in the applicable oversight document.

(b) The RA workplan should include:

1. The location and description of any construction facilities and a listing of all applicable SCGs relating to the construction of on-site remedial units including inspection and professional engineer certification;

2. A description of soil and sediment erosion control, storm water management and monitoring, and dust, odor and organic vapor control and monitoring procedures to be implemented during remedial activities, if applicable;

3. A health and safety plan pursuant to section 1.9;

4. A detailed description of confirmation sampling and site restoration plans to comply with section 5.4(c);

5. A description of procedures for dismantling and removal of remedial structures and equipment from the site, if applicable;

6. A cost estimate, where applicable, of the remedial action;

7. A schedule in accordance with section 5.7;

8. A description of institutional controls to be implemented and written approval from the owner of the property where the institutional control will be placed, if the remedy selected requires implementation of an institutional control at an off-site location or if the person responsible for the remedy is not the site owner; and

9. An OM&M plan will be developed in accordance with section 6. This should include a schedule for the submittal of the final OM&M plan, which takes into account the proposed initiation of any portion of the remedy subject to the OM&M plan.

5.4 Remedial action performance compliance

(a) In order to document the effectiveness of a soil removal, the following sampling activities are to be performed:

1. All sampling should be conducted pursuant to sections 3.2 through 3.11.

2. For soils, if excavation is conducted, the minimum post remediation sampling frequency should be:

i. For excavations less than 20 feet in perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.

ii. For excavations 20 to 300 feet in perimeter:

(1) For surface spills, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.

(2) For subsurface spills, one sample from the bottom of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.

iii. For larger excavations, sampling frequency may be reduced if documentation acceptable to the DER is provided in the remedial action report, in accordance with section 5.8, specifying why the sample frequency was considered adequate.

iv. For volatile organics bottom samples taken within 24 hours of excavation, samples should be taken from the zero to six inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches. For excavations open longer than two weeks, volatile organics sample depth for bottom samples should be in accordance with section 3.5.1.

v. Each excavation within a larger excavation will be considered a separate excavation and should comply with (a)(2) i-iv above.

vi. For tanks, if contaminated soil is removed, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal pursuant to section 5.5(b)4(ii) and (iii). If the excavation is enlarged horizontally beyond the immediate tank removal area, additional soil samples will be taken pursuant to (a)2i through iv above.

3. Post-remediation sample locations and depth should be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination.

(b) For in situ remediation, a sampling program appropriate to the site or area of concern, should be used to determine the design parameters of the treatment system have been achieved and to document the effectiveness of the system.

(c) All areas subject to remediation should be restored, to the extent practicable, to pre-remediation conditions with respect to topography, hydrology and vegetation, unless alternate restoration is approved by the DER.

1. Sites located adjacent to or in wetlands or in or near other environmentally sensitive areas, may have further requirements under the NYS Wetland regulations 6 NYCRR Parts 608, 661 & 663.

2. Fill material used to restore a site after the remediation has been completed should be approved in advance by the DER. Fill used for new building foundations or other construction in remediated areas is exempted from this requirement.

i. Fill should be uncontaminated pursuant to any applicable remediation standard and free of extraneous debris or solid waste.

ii. Documentation of the quality of the fill including sampling data may be required by the DER.

iii. Uncontaminated soil from the site may be returned to excavations or may be used elsewhere on the site.

iv. The bills of lading should be provided to the DER to document the source(s) of fill. The documentation should include:

(1) The name of the affiant and relationship to the source of the fill;

(2) The location where the fill was obtained and a brief history of the site which is the source of the fill.

(d) After completion of remediation, submission of appropriate completion reports under section 5.8, and acceptance by the NYSDEC, all monitoring and extraction wells should be decommissioned in accordance with section 6 unless otherwise approved by the DER.

(e) For larger remediations, sampling frequency may be reduced if documentation acceptable to the DER is provided in the remedial action report specifying why the sampling frequency was considered adequate.

5.5 Underground Storage Tank closure

(a) As a first priority during underground storage tank (UST) closure, contaminants in all media should be removed, treated, contained and/or stabilized to prevent contaminant exposure to receptors and to prevent further movement of contaminants through any pathway. The following will apply to the closure:

1. A health and safety plan must be developed, as referenced in section 1.9.

2. Underground tank closures not performed in accordance with this section will require a certification of the closure report, as specified in 5.5 (c) and in compliance with section 1.5.

3. Minor variances and field adjustments may be approved, in accordance with section 1.6.

(b) The following requirements will be followed for the closure of all NYS regulated UST and any other tank found to have caused a contaminant discharge to the environment:

1. Provide the DER ten (10) days notice prior to the closure of a regulated UST or other tank for which DER oversight is sought or mandated.

2. Determine whether the tank is to be abandoned in place or removed. Removal of the tank and excavation of associated contamination is the preferred method. Abandonment in place should only be considered when the physical constraints of the site prevent the safe excavation of an underground tank. Abandonment in place may be prohibited if:

i. Local regulations specify removal;

ii. The tank is suspected of having leaked as a result of documented evidence. Evidence such as local impacts, inventory records and/or tank test results may be used.

iii. During the tank closure process product or product contaminated soil or groundwater is discovered. The DER will make the determination whether the tank has to be removed to investigate the site and perform cleanup of contaminated soil.

3. Deactivate or remove the tank and ancillary equipment, if practically feasible, per NYSDEC guidelines, identified in section 7.6.

4. During tank and pipe line removal, the following field observations should be made and documented:

i. A description and photographic documentation of tank and pipe line condition (e.g. pitting, holes or leak points);

ii. The excavation floor and sidewalls:

(1) Should be examined for any physical evidence of soil contamination and,

(2) Should be field screened with an appropriate and properly calibrated field screening tool or kit along transects spaced no more than five feet apart, so that sampling may be biased to the suspected location of greatest contamination.

iii. If there is no evidence of a discharge, soil samples for laboratory analysis should be taken immediately after tank removal as follows:

(1) If there is no groundwater in the excavation, discrete center line soil samples from the bottom of the excavation are required at a frequency equal to the total length of the tank divided by five, (minimum of one sample), provided that samples are spaced equidistantly and that the outermost samples obtained are no greater than 2.5 feet from each respective end of the tank. If the total length of a tank in feet is not evenly divisible by five, one additional sample should be obtained for any fraction remaining;

(2) If there is groundwater in the excavation, soil samples should be taken as follows:

(A) If the contents of the UST have ever had a density less than or equal to water, one sample biased based upon field screening to the suspected location of greatest contamination, should be taken near or above the water table from each excavation sidewall for every 30 linear feet of sidewall (minimum of one sample per sidewall); except that, for heating oil tanks of 550 gallon capacity or less, one sample, biased to the suspected location of greatest contamination, may be taken from one excavation sidewall near or below the water table; Seasonal fluctuations in the water table elevation can submerge and smear product over a range of several feet. A sample of the water in the excavation should also be collected pursuant to section 3.7.1(c);

(B) If the contents of the UST have ever had a density greater than water, grab samples should be taken of the excavation at a depth from zero to two feet beneath the tank on four foot centers across the length of the excavation. These samples should be field screened with an appropriate tool or test kit. The four samples with the highest field screening results should be submitted for the appropriate laboratory analysis. A sample of the water in the excavation should also be collected pursuant to 3.7.1(c);

(C) If the tanks contained mixed substances such that some contaminants had a specific gravity of more than one and some contaminants had a specific gravity of less than one (for example no. 6 fuel, waste oil potentially contaminated with chlorinated solvents), samples should be taken pursuant to (b) 4 iii. (2) A&B above; and

(D) Soil samples taken from below the water surface should be taken using appropriate sediment sampling methods.

iv. If there is evidence of a discharge, excavation should continue until all contaminated soil is removed or until further excavation is not practical. Once excavation is complete and no groundwater is encountered, soil samples should be taken to demonstrate that contamination has been removed. A minimum of 5 soil samples should be taken, consisting of 4 sidewall and 1 bottom sample for each 15 linear fee of trench. The samples should be biased based upon field screening towards the suspected location of greatest contamination. If contaminated soil remains in place after excavation and a soil remedial action will occur, refer to Section 6.6. If there is evidence of a discharge, but there is insufficient soil to conduct a soil remedial action, (for example, tank is located in bedrock), or any portion of the tank is located within or immediately above the groundwater table, a groundwater sample should be taken pursuant to section 3.7.1(c);

v. If there is any evidence of groundwater contamination, including without limitation, a sheen or odor, a groundwater sample should be collected pursuant to section 3.7.1 and soil samples collected as per iv. above; and

vi. A description of product type and quantity spilled from tank or tank system during excavation.

5. For a tank to be abandoned in place, the tank should be deactivated pursuant to paragraph (b)3 above and

the following requirements:

i. After the tank is cleaned, the tank should be inspected and any areas of questionable integrity, including, without limitation, any cracks or corrosion, or evidence of discharge, should be documented. Photographs may be submitted to document that the integrity of the system has been breached, if the evidence is clearly visible in the photograph;

ii. Upon completion of tank cleaning, soil sampling will be conducted by completing borings through the bottom of the tank, along the centerline, at a frequency equal to the total length of the tank divided by five (minimum of one sample), provided that the samples are spaced equidistantly and that the outermost samples obtained are no greater than 2.5 feet from each respective end of the tank. If the total length of a tank is not evenly divisible by five, one additional sample should be obtained for any fraction remaining;

iii. If groundwater has been determined to be in contact with the tank invert and there is no evidence of a discharge, sampling should be conducted in accordance with section 3.9(a)3i(4);

iv. Procedures should comply with any local ordinances.

6. If the underground storage tank is located under a permanent structure or is physically inaccessible or a certification is submitted, signed and sealed by a licensed New York professional engineer, stating that the sampling requirements at 5.5(b)5. ii, iii and iv above for closure of the underground storage tank will cause damage to an adjacent structure, an alternate method for documenting the integrity of the tank may be submitted for DER approval pursuant to section 1.6(d);

(c) All piping systems associated with the underground tank will be properly closed and should be evaluated for leakage, in accordance with section 3.9(a)5.

(d) A tank closure report should be prepared following the format presented in Section 5.8.

5.6 Institutional controls

(a) If an institutional control, consisting of deed restrictions or covenants, is required by the decision document for the site, to restrict activities on or off the site, the person responsible for conducting the remediation should submit the following information to the DER:

1. A map showing the area of control;

2. Description of the controls;

3. The property owner's agreement to establish and maintain the institutional controls, which are expressly made enforceable by the State, set out in such form as to be recordable pursuant to Real Property Law section 291.

(b) If an institutional control is required in (a) above, documentation is to be submitted to DER establishing that the person responsible for conducting the investigation and/or remediation has notified the persons listed below, and any others in accordance with section 1.4, of the intent to establish the institutional control. This notification should:

1. Be sent by certified mail, return receipt requested to:

i. Any adjacent property owner, and

ii. The state and local health departments and clerks of the governing bodies of each municipality in which the institutional control area is to be located.;

2. Describe the type and areal extent of the contamination to be addressed by the institutional control;

3. The proposed remedial action and its projected duration;

4. The limitation on site use that will be necessary based on the contamination present and the proposed remedial action; and,

(c) For institutional controls consisting of other than deed notices or covenants, the requirements of (a)1 and 2 and (b), above will apply.

5.7 Remedial action schedule and progress reports

(a) A schedule for completion of the remedial action by task and final completion schedule is to be prepared in addition to progress reports, and revised at a frequency which will be specified by the DER in the oversight document. The remedial action completion schedule should contain the following elements:

1. Schedules should utilize monthly time frames, when possible, for the initiation or completion of tasks;

2. The remedial action workplan should not list specific dates as these will be contingent upon DER approval of the remedial action workplan;

3. After remedial action workplan approval is obtained, the schedule should be revised to identify the projected month/year for each task;

4. All tasks for all areas of concern should be identified in the schedule;

5. Contractor bidding/review/acceptance process time frame should be included in the schedule;

6. The schedule should consider time frames for any required site access agreements permit applications and final permit approvals. A critical path schedule should be included when any permits are involved because certain tasks cannot proceed without permit approval;

7. When projecting dates for submission of reports to the DER, the schedule should consider review time of not only the person preparing the report but all other persons who are deemed necessary to finalize the report;

8. The schedule should identify all anticipated report submittals (month/year) to the DER including, without limitation, progress reports, groundwater monitoring reports, post-remediation data reports for individual areas of concern, construction design reports, final remedial action reports and OM&M plans. Laboratory analysis time should be accounted for in projecting report submittal dates;

9. The schedule should allow for reasonable DER review time of submitted reports;

10. Institutional control requirements;

11. The schedule should include a time frame for site restoration (backfill, regrade, pave, etc.) and DER final inspection; and

12. The schedule should include projected date for implementation of the approved OM&M plan.

(b) Periodic progress reports are to include, at a minimum, the following information:

1. Specification/reporting of all remedial actions accomplished during the reporting period;

2. Proposal of any deviations from and/or modifications to the approved remedial action workplan. All modifications should be approved by the DER prior to enactment;

3. Reporting of problems or delays in the implementation of the remedial action workplan. Proposed

corrections should be presented with changes to the approved project schedule and will be approved by the DER. A revised schedule should be submitted as part of the progress report. The status of all permit applications should be included in this schedule;

4. Identification of the remedial actions for the next reporting period;

5. If required in a workplan pursuant to section 3.3, the following will be provided:

i. Tabulation of all sample results received during this period pursuant to section 3.14(c)3 and submission of a report summarizing the data and presenting conclusions; and

ii. Tabulation of waste classification and/or characterization samples collected including the physical state of the material (solid, liquid, sludge), the volume of material, number of samples collected, analyses performed and results.

6. A listing of all types and quantities of waste generated by the remedial action during the reporting period and to date. Include the name of the disposal facilities, and transporters' dates of disposal, and if appropriate, the manifest numbers of each waste load; and

7. Any additional support documentation that is available (for example, photographs) should be submitted.

5.8 Remedial action report

(a) Any remedial action report submitted to the DER for approval should present and discuss all data and information collected in compliance with this section, where applicable. The report should be presented in a format that corresponds directly to the outline of this section.

(b) Any remedial action report submitted to the DER for approval should include the following:

1. A summary of the remedy from the decision document;

2. A summary by area of concern of all remedial actions completed, which includes:

i. A description of any problems encountered during construction and their resolution;

ii. A description of changes to the design documents and why the changes were made;

iii. Quantities and concentration of contaminants removed or treated;and

iv. A listing of the waste streams, quantity of materials disposed and where they were disposed.

3. A list of the remediation standards applied to the remedial actions;

4. Tables and figures pursuant to section 3.14 (remedial investigation report) containing all pre- and post-remedial data keyed appropriately so that completion of the remedial action is documented. The figures should clearly indicate the volume of contaminated soil or sediment which was remediated:

5. A detailed description of site restoration activities pursuant to section 5.4 (c);

6. A detailed description of source and quality of fill pursuant to section 5.4 (c);

7. A detailed report of actual costs including bid tabulations and change orders, if any State funding is provided;

8. "As-built" drawings should be provided for, which include:

i. Any permanent structures including, without limitation, caps, slurry walls, treatment units, piping and instrumentation diagrams or other remedial structures which will remain in place after completion of the remedial action, as well as document areas of changed conditions or removals;

ii. All soil removals, indicating the surveyed limits of the excavation and location of all final confirmatory samples;

iii. All underground storage tank removals. A site plan showing the location, including latitude and longitude, of the tanks removed or abandoned in place and the extent of any soil removal as per ii. above; and

iv. Permanent survey markers for horizontal and vertical control for sites long term maintenance as defined by section 6.

9. Fully executed manifests documenting any off-site transport of waste material;

10. Filed copy of any engineering or institutional controls that are required; and

11. The OM&M plan, in accordance with section 6.

(c) For active groundwater remedial actions, the remedial action report should also include:

1. Figures representative of flow conditions immediately preceding initiation of the remedial action and flow conditions representative of pumping conditions; and

2. Graphs depicting changes in contaminant concentration over time for all contaminated non-pumping monitoring points and all downgradient delineation monitoring points.

SECTION 6: OPERATION, MAINTENANCE, MONITORING & CLOSEOUT

(a) This section provides the general guidance for designing and implementing the operation, maintenance and monitoring (OM&M) of all sites for which DER has oversight responsibility pursuant to section 1.2 (b). Included in this section is guidance for:

1. Design of an OM&M program, in accordance with sections 6.1, 6.2 and 6.3;

2. Implementation of the program, in accordance with section 6.4;

3. Oversight to ensure that institutional and engineering controls are in place and remain effective, in accordance with section 6.5;

4. The termination of treatment system operation, in accordance with section 6.6; and

5. The completion of oversight activities by the DER and closeout of the site, in accordance with section 6.7

6.1 Operation, maintenance and monitoring requirements

(a) OM&M is the last phase of remediation, and continues until the remedial action objectives for the project are met and the site is closed out. The person responsible for conducting the remediation at a site is to ensure that all OM&M responsibilities are performed as required by law. OM&M requirements will vary at each site, therefore a site-specific OM&M program, developed in accordance with Appendix 6A, is to be developed to:

1. Operate and maintain engineering controls and/or treatment systems;

2. Maintain institutional controls, where applicable;

3. Inspect and evaluate site information periodically to confirm that the remedy continues to be effective for the protection of public health and the environment;

4. Monitor and report the performance and effectiveness of the remedy, both short and long-term, by:

i. Assessing compliance with actual or equivalent discharge permit limits;

ii Assessing achievement of the remedial performance criteria; and,

iii. Sampling and analysis of appropriate media;

5. Determine when the remedy is complete by demonstrating that the remedial action objectives have been achieved.

(b) Sites requiring OM&M fall into two categories:

1. Sites which will be operated for less than 18 months, where only limited monitoring will be required. For these sites;

i. The determination as to whether a site falls in this category will be made during the first annual project evaluation, as described in section 6.4 (a).

ii. Sites in this category will not require:

(1) A monitoring plan, in accordance with section 6.3 or

(2) The preparation of the first annual report, in accordance with section 6.4 (d)3.

iii. Sites in this category will comply with:

(1) The OM&M provisions of section 6.2 (a) and 6.3 (a) 1, and;

(2) The OM&M reporting requirements of section 6.4 (d) 4.

2. Sites which will be operated and monitored for more than 18 months will require an OM&M manual, in accordance with section 6.3 and the outline provided in appendix 6B. Sites in this category include, but are not limited to, sites where;

i. Treatment systems are operating or wastes have been contained on-site;

ii. Engineering and/or institutional controls are required by the remedy;

iii Monitored natural attenuation is the selected remedy;

iv Plume monitoring management is required; and/or

v. Periodic sampling and analysis is required to demonstrate reduction of contaminants in surface water, sediment, biota or other media.

(c) Both categories of sites identified in (a) and (b) above, are to be closed out in compliance with section 6.7.

6.2 Operation, maintenance and monitoring manual

(a) No OM&M manual is required to be prepared for emergency removal actions, tank closures pursuant to section 5.5, and remediations defined in section 6.1(b)1. Where no OM&M manual is required, excerpts from manufacturer catalogs which describe the equipment, specifications, operation and maintenance procedures, etc. (equipment catalog-cuts) should be maintained at the site by the person responsible for conducting the remediation at a site, if applicable.

(b) For all other sites, operable units or areas of concern, the OM&M program requirements should be documented in a site-specific OM&M manual developed in accordance with the workplan required by sections 5.2 or 5.3. If there are engineering controls and/or a treatment system on-site, then the OM&M manual, must be signed and stamped by a professional engineer licensed in the State of New York, in accordance with section 1.5 (a).

(c) The OM&M manual should:

1. Be a complete document which can stand alone and be implemented by individuals unfamiliar with the site.

2. Be updated periodically during use, to reflect changes in site conditions or the manner in which the remedy is operated and maintained.

3. Incorporate the relevant portions of documents referenced in the OM&M manual, such as manufacturer operation and maintenance manuals, shop drawings, equipment catalog-cuts, as defined in 6.2(a) above, specifications from the contract documents,"as built" drawings (see section 5.8 (b) 8, and any applicable requirements of Federal, State and local regulations.

4. If determined necessary by the DER, the OMM&M manual should be organized into three sections, as outlined in appendix 6B, for ease of future reference and updating, as well as the day-to-day operation, maintenance and monitoring of the site.

5. Include a monitoring plan, a contingency plan, a health and safety plan and a list of records and references.

(d) A contingency plan is a section of the OM&M Manual which describes procedures to be conducted in the event of an emergency, such as a fire, spill, tank or drum overflow or rupture, severe weather or vandalism, which may be required to protect and/or maintain the operation of the remedy.

1. A contingency plan includes the following, as necessary:

i. An emergency contact list with telephone numbers;

ii. Response procedures, including procedures for auto dialers;

iii. An evacuation plan, which should include a map and route to the nearest hospital;

iv. Agreements with response officials;

v. Provisions for amending the contingency plan; and

vi. Other appropriate procedures and forms, requested by the DER.

2. The contingency plan should be developed in accordance with the workplan specified in sections 5.2 or 5.3, and include provision for:

i. A copy of the contingency plan to be provided to each emergency contact listed in the plan.

ii. Revisions to be made to the plan when substantial changes are made to the operation of the remedy.

iii. Where appropriate, a copy is to be available at the main gate of a facility, in a locked waterproof container, with a key provided to responders or those on the contact list.

3. Implementation of the contingency plan includes providing an initial tour during shake-down and subsequent tours annually (or as requested by local responders) to the emergency contacts.

6.3 Monitoring plan

(a) The monitoring plan is the section of the OM&M Manual which describes the measures for monitoring the performance and effectiveness of the remedy at a site. Each monitoring plan will vary depending on the type of monitoring, the site location and characteristics, the remedy and the terms of the oversight document for the site.

1. No formal monitoring plan is required for remediation sites as defined in section 6.1(b)1. However, any wells to be monitored will require analytical results for the contaminants of concern for two sampling events twelve months apart.

(b) Performance monitoring is the regular assessment of physical and chemical parameters, to determine if the remedy is performing as designed. Performance monitoring includes, but is not limited to:

1. Measurement of the area or volume of the media being treated;

2. Sampling of the influent, intermediate, and/or effluent streams;

3. Measuring static water elevations in wells, to determine groundwater flow paths and to evaluate the performance of in-ground containment or groundwater control structures;

4. Measuring the mass of contaminants removed and calculating removal efficiency, and/or;

5. Evaluating the results of performance monitoring and implementing maintenance and/or system adjustments if the data identifies that the system is not operating successfully.

(c) Effectiveness monitoring is the periodic chemical and physical analysis of groundwater, surface water, soil, sediment, air and biota, etc., to determine and/or confirm that the objectives of the remedy are being achieved. Effectiveness monitoring can be conducted using data obtained from other phases of the investigation and remediation. Effectiveness monitoring requirements for the various media are as follows:

1. For groundwater effectiveness monitoring:

i. A network of wells should be designed and monitored over time to assess both up-gradient and down-gradient conditions in the vicinity of the remediation.

ii. The network of wells must provide adequate and effective collection points for samples, so that all areas of concern at a site are included.

iii. In addition to chemical data collected for the contaminants of concern, groundwater should be characterized as to its temperature, pH, conductivity, turbidity, and, where appropriate, indicator parameters for monitored natural attenuation at the site.

2 For surface water, soil, sediment, air and biota effectiveness monitoring:

i. Requirements need to be established for confirmatory sampling, on a case-by-case basis.

ii. For biota sampling, an off-site reference location should be selected. Prior to implementing the remedial action, baseline sampling should be conducted both on and off-site to establish the reference condition.

3. For monitored natural attenuation (MNA), a groundwater monitoring program should be implemented to monitor plume characteristics, movement, and related controlling processes, to obtain data for calibrating a model to be used for estimating the eventual extent of the plume, and to assess the effectiveness of the monitored natural attenuation remedy. The following elements should be included in the program.

i. Sampling should be conducted on a quarterly basis at monitoring wells associated with the monitored natural attenuation, for a minimum of eight quarters, including:

(1) At least one area-of-concern monitoring well, located at the source area(s), to monitor plume conditions at the source area;

(2) At least one plume sampling point located downgradient of the source area, but within the contaminant plume, except as provided in(c)3. i. (3) below;

(3) At least one plume fringe monitoring well located at the limit of the plume, defined as an area where contaminant concentrations are below applicable SCGs. If compounds without applicable SCGs are identified, they will be evaluated on a case-by-case basis. Depending on the areal extent of the contaminant plume, the DER may determine that one monitoring well may satisfy the requirements of both (c)3.i(2) above and this subparagraph; and

(4) At least one downgradient sentinel well located beyond the zone of groundwater exceeding applicable SCGs. Contaminant levels in this sentinel well must remain below the applicable standard for MNA to be considered effective. The sentinel well should be located no closer than three years' travel time of groundwater to the nearest potential down-gradient receptor and no further than five years' travel time from the delineated down-gradient extent of the contaminant plume.

(5) At least one sampling point at the centerline of the plume.

ii. Data collected pursuant to (c) 3. i. above should be evaluated, and the person responsible for conducting the investigation and/or remediation, should document the effectiveness of MNA in the annual report prepared pursuant to section 6.4 (d)3.

4. Plume management monitoring (PMM) requires a comprehensive and dynamic approach to groundwater monitoring. PMM requires a network of wells, sufficient in scope to monitor the ultimate fate and transport of the plume and to project impacts to sensitive receptors. Each site specific program is custom fit and adjusted based on observed plume dynamics and predictive modeling. Monitoring wells are placed along the plume and in its projected path based on vertical and horizontal profiling, three dimensional modeling, proximity to sensitive receptors and professional judgement. Multilevel wells are used at various locations to bracket the plume vertically. Data from all monitoring points are used to calibrate the predictive model to ensure that it truly describes the contaminant plume and to validate the protection of sensitive receptors. The following elements should be included in the program.

i. Sampling should be conducted on a quarterly basis at monitoring wells associated with PMM, for a minimum of eight quarters, including:

(1) At least one multilevel well in the source area to monitor contaminant concentrations and determine vertical hydraulic gradients.

(2) At least one multilevel well located downgradient of the source area along the centerline of the plume screened so that it brackets the plume vertically.

(3) At least one plume fringe monitoring well located at the limit of the plume, defined as an area where contaminant concentrations are below applicable SCGs. This well should be screened spanning the projected depth of greatest concentration based on the observed vertical gradient.

(4) At least one multilevel sentinel well located beyond the zone of groundwater exceeding applicable SCGs screened bracketing the projected depth of contamination. The sentinel well should be located no closer than three years travel time of groundwater to the nearest potential downgradient receptor and no further than two years' travel time from the delineated down-gradient extent of the contaminant plume.

(5) Additional monitoring wells may either be pre-installed along the centerline of the projected plume or immediately (within two weeks) after contaminants are first detected in the downgradient sentinel. The time difference between the projected and observed first detection of contaminant should be used to refine the predictive model. The downgradient distances to successive wells will be adjusted based on the degree of predictive success.

(6) As the plume moves toward its discharge point, the sampling frequency of upgradient wells may be reduced based upon suitable trend line analysis and higher confidence in the predictive model. Once the plume reaches its discharge point the monitoring well network may be scaled back further depending on site specific assurance requirements.

ii. Should the plume reach apparent stability before its point of discharge, the use of MNA, in accordance with section 6.3(c)3 can be evaluated.

5. For sites or areas of concern involving impacts to fish and wildlife resources, monitoring may be required after implementation of the remedy, to evaluate physical, chemical and biological conditions resulting from the remedy, as well as the long-term effectiveness of the remedy. Fish and wildlife resource monitoring should be conducted following the monitoring plan developed according to this section.

i. Where applicable, monitoring of fish and wildlife resources should include photographic documentation.

ii. As applicable, physical conditions to be monitored include:

(1) Inspection of wetland or other plantings installed during site restoration, to ensure acceptable growth and survival, and for removal of invasive species. Restorative plantings which do not meet specified parameters must be replaced. For wetland restorations, a five-year monitoring and replacement period should be included in the OM&M Manual;

(2) Inspection of stream-bank stabilization measures, to ensure proper function after completion of the remedy. Any erosion or slumping of the bank or loss of erosion-control vegetation should be addressed immediately by repair or replacement;

(3) Monitoring of water levels and vegetation in wetlands or water bodies where hydrological conditions were altered as a result of construction; and

(4) Post-remedial observation of the health or behavior of endangered, threatened or special-concern species or rare ecological communities, to document that there are no lasting effects of construction activities.

iii. As applicable, chemical and biological monitoring of post-remedial conditions includes:

(1) Collection and analysis of fish or other biological tissue, to document reduction of contaminants in the resource;

(2) Monitoring macrobenthic populations or other environmental indicators, to determine that an unimpacted habitat condition has been achieved or is being maintained;

(3) Conducting toxicity testing of sediments or surface waters, to determine that a nontoxic condition has been achieved or is being maintained; and

(4) Post-remedial observation of the health or behavior of endangered, threatened or special-concern species or rare ecological communities, to document that there are no lasting effects of construction activities.

d) Trend monitoring is conducted once there is sufficient data of the appropriate quantity and quality to develop an understanding of the effectiveness of the remedy in addressing the exposures presented by the site and to begin to identify any trend(s) with regard to the achievement of remedial objectives.

1. Sampling and analysis to establish a trend in groundwater may require at a minimum:

i. Eight data points resulting from two years of quarterly monitoring of the same wells during the four seasons each year;

ii. If a site has been sampled quarterly for two years and the results do not show any significant contamination or changing trends, upon approval from the DER, it may then be appropriate to sample every fifth quarter, to evaluate the results of approximately annual sampling with the benefit of evaluating possible seasonal variations; and

iii. The analytical results should be plotted and evaluated to identify any trend in conditions and site impacts, or to illustrate that remedial objectives have been met.

2. Additional sampling to establish a trend in surface water, soil, sediment, air, and/or biota may be necessary for some sites. For some sites a statistical analysis of the data may be considered to establish or verify a trend. Where required, any statistical analysis should be data-specific and the method used is to be approved by the DER prior to data analysis.

i. In order to provide statistical reliability for biota sampling, a minimum of five samples should be collected at each location.

(e) A monitoring plan should include the following:

1. An identification of the sampling points and the number of samples to be collected, including private drinking water wells, municipal and commercial wells, and monitoring wells;

2. Logs for all wells;

3. The sampling frequency;

4. The analytical method(s) to be performed and the analytical program requirements for the collection and analysis of the media to be sampled, for the contaminants of concern. Sampling collection protocols should include:

i. Well purging volumes and methods documented for each sampling event; and

ii. The qualifications of the laboratory for the sampling and analytical procedures, as described in section 2.2.

5. Quality assurance/quality control requirements pursuant to section 2;

6. A list and description of the sampling locations for other treatment systems, such as between carbon units;

7. Inspection and maintenance requirements for monitoring wells;

8. Collection procedures for biota, as specified by the Department; and

9. Well decommissioning procedures, as specified in the NYSDEC "Groundwater Monitoring Well Decommissioning Procedures."

6.4 Operation, maintenance and monitoring implementation

(a) The person responsible for conducting the remediation of a site should conduct inspections and evaluation of a site whenever a severe condition occurs at a site, such as major erosion, flooding, or breakdown of the treatment system. Unless otherwise specified, inspection and/or monitoring of a project should be at least annually, using the OM&M Manual as a guide. For remediation of sites, as defined in section 6.1(b)1 where no monitoring plan is required, 6.4(d) below does not apply.

1. An annual project evaluation should be conducted in such a manner to achieve the following objectives:

i. Evaluation of the compliance of the remedy with the requirements of the decision document for the site;

ii. A comprehensive evaluation of the operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;

iii. Evaluation of the performance and effectiveness of the remedy;

iv. Documentation of any necessary changes to the remedy and/or monitoring system;

v. Recommendations for changes and/or new conclusions regarding the site contamination based on this evaluation; and

vi. Provide information to the public.

2. The annual project evaluation consists of :

i. Sampling according to the monitoring plan;

ii An inspection, in accordance with (b) below;

ii Review of the site data and evaluation of inspection reports in accordance with (c) below, and;

iv Submission of an annual report in accordance with (d) 3. below.

(b) Inspections should be documented on an inspection form developed for the site, which should compile sufficient information to:

1. Examine the OM&M being conducted including, where appropriate confirmatory sampling and a health and safety inspection;

2. Assess the site conditions, including an evaluation of the site, any building(s) and any treatment system(s),

3. Assess compliance with permits and schedules included in the OM&M Manual;

4. Assess whether site records are up to date; and,

5. Assess compliance with any institutional controls.

(c) Inspection results and site monitoring data are evaluated to confirm that:

1. Operation and maintenance, as well as the performance and effectiveness of monitoring activities, are being conducted properly;

2. The remedy continues to be protective of public health and the environment; and

3. Engineering controls, treatment systems and associated institutional controls are in place, are performing properly and remain effective.

(d) The OM&M report should present and discuss all applicable data and information collected in compliance with this section. The report should be presented in a format which corresponds directly to the outline of this section. The person responsible for conducting the remediation of a site will submit the following reports to the DER relative to the OM&M of the site:

1. Discharge monitoring reports for SPDES or air permits, or equivalent discharge requirement reports where a permit was not required, are to be submitted to the DER pursuant to the OM&M manual;

2. Interim OM&M reports for periodic (monthly, quarterly or biannual) effectiveness monitoring, on-line performance, and/or inspections and repairs are submitted within 45 days of each specified period, or as specified by the OM&M manual. The interim report should include the following:

i. The valid Department site identification number, plus the municipality and county, in the title of the report;

ii. A description of the on-line performance of the treatment system(s), if present; this includes:

(1) The number of days the system was run for the reporting period;

(2) The gallons processed per time period and the cumulative total for the process; and

(3) The average, high and low flows per day;

iii. The monthly or quarterly permit equivalent data;

iv. The mass removed for SVE systems, air-sparging systems, or groundwater treatment systems;

v. A map showing sampling and well locations, and significant analytical values at sampling locations, if effectiveness monitoring is performed;

vi. Cumulative data summary tables and graphical representations of contaminants of concern,

(1) "Raw data" is only required to be submitted for sites with no formal OM&M program as defined by section 6.1 (b) 1,

(2) Only include detected compounds, along with the applicable standards and with any exceedences highlighted, need be reported for all other sites;

vii. A description of routine maintenance and inspection forms per (b) above;

viii. A description of breakdowns and/or repairs along with an explanation for any significant downtime; and

ix. Comments, conclusions and recommendations based on an evaluation and resolution of performance problems.

3. An annual report which summarizes all of the monitoring reports and documents the results, conclusion and recommendations of the annual project evaluation is to be submitted, within 90 days of the final sampling event of the year. The annual report must include all the requirements for an interim monitoring report as specified in (d)2. above, as well as the following:

i. A location map;

ii. A site map;

iii. Additional figures, such as groundwater contour or contamination contour maps which summarize findings;

iv. A brief description of the applicable standard test methods run;

v. All quarterly or semi-annual data with relevant comments and conclusions;

vi. Comments, conclusions and recommendations based on an engineering evaluation of the information included in the report, which must be prepared by a professional engineer in accordance with section 1.5 (a) 9,where engineering controls or a treatment system are components of the site remedy; and

vii.. Comments, conclusions and recommendations based on an evaluation of the information in the report where institutional controls exist, or for a remedy where MNA or PMM is a component, prepared by a qualified person, pursuant to section 1.5(d).

4. All interim OM&M reports and annual reports will be a bound, written report of findings, or an equivalent, in electronic format (i.e. compact computer disks (CD's)) acceptable to the DER.

6.5 Institutional and engineering controls

(a) The person responsible for conducting the remediation at a site must provide certification regarding the continued effectiveness of any institutional and/or engineering controls required by the decision document for a site on a yearly basis. This certification, prepared in accordance with section 1.5(a) for institutional controls and engineering controls, is to be included in the annual report required by section 6.4(d)3.

(b) The certification must identify any required institutional and/or engineering controls and evaluate whether:

1. The controls should remain in place, and;

2. They remain effective for the protection of public health and the environment.

(c) Where engineering controls are a component of the remedy, the corresponding institutional controls must be maintained.

6.6 Remedial process closure requirements

(a) A remedial process is considered completed when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. When this occurs, the treatment system can be shut down and/or monitoring of a plume can be terminated. More specific details of shut down procedures are discussed in other DER guidance, as listed in Section 7.

1. System closure is initiated when the SCGs or the remedial objectives of the decision document have been satisfactorily achieved. If compounds without applicable SCGs are identified, they would be evaluated on a case-by-case basis.

2. Dependent on site-specific considerations, site closure may be initiated before the groundwater standards or the remedial action objectives of the oversight document have been met, where it can be demonstrated that it would not be technically and/or economically feasible to continue operation of the remedy.

3. Remedial process closure requirements are included in this section for the following:

i. Remedial treatment systems in (b) below;

ii. Monitored natural attenuation and in (c) below;

iii. Plume management monitoring in (d) below; and

iv. Drinking water treatment systems in (e) below.

4. The person responsible for conducting the remediation, however, may still be a required to monitor an engineering and/or institutional control or to conduct additional groundwater monitoring to track a plume.

(b) The determination by the DER that continued operation of a remedial treatment system is no longer effective and the system can be shut down, is governed by the following evaluation of system performance.

1. Points at which the evaluation of continued system operation begins include asymptotic removal rates of less than ten pounds per month, removals of ninety-five percent of the total mass identified, and/or site-specific groundwater considerations such as discharge options and groundwater strategy implications, as specified in the decision document to be the shutdown criteria.

2. If the decision document for the site, operable unit or area of concern has not incorporated a specific shutdown criteria for the remedial system, the following methodology is recommended to evaluate whether

permanent system shut down conditions have been reached.

i. When the data show that the remedial treatment system appears to have achieved asymptotic removal rates, the remedial treatment system is pulsed, i.e., cycled on and off for specified time periods, to evaluate the influence that a period of inactivity has on contaminant concentrations, and how quickly the system can equalize to the pre-shutdown concentrations when it is re-started.

(1) An increase in concentrations when the remedial treatment system is re-started, indicates that the system may continue to be effective in removing contaminants using a pulsing schedule.

(2) If the post-shutdown removal concentrations are the same as the pre-shutdown concentrations, then the system can be considered to no longer be removing a significant level of contaminants and that it may be appropriate for the DER to consider shutdown of the system.

(3) A decrease in contaminant levels in adjacent groundwater monitoring wells during shutdown may also correlate to decreasing levels in the surrounding saturated contaminated soils. This may also be considered by the DER in justifying remedial system shutdown.

ii. The mass of contaminant(s) extracted over time and the groundwater monitoring data are graphically recorded, to illustrate the effectiveness of system operation and the influence that the pulsing has had.

(1) A minimum of 8 groundwater data sets are necessary to statistically demonstrate within 95% confidence limits that asymptotic conditions have been reached, unless conditions of section 5.5(b)4 have been met.

(2) Ideally, a system will not be shut down until the contaminant levels in soil samples are near or below the levels for the protection of groundwater, groundwater standards have been met at the property line(s), and contamination levels beyond the property line(s) no longer will reach levels which may impact public health and the environment.

iii. At the point when system performance has reached asymptotic conditions, collection of soil samples from borings drilled at the source area and/or the property lines, and comparison to recommended soil clean-up levels is required.

iv. If the soil clean-up levels have not been achieved, and evaluation of site-specific options and possible impacts indicate that further remediation is necessary, the system must continue to be run and then additional optimization of the system may be required, e.g., additional wells or other modification of the current system configuration may be an alternative.

v. The person responsible for the investigation and/or remediation may request approval from the DER to shut down the remedial treatment system, if:

(1) The soil cleanup levels have been achieved;

(2) It is determined that contaminated groundwater can be discharged without further treatment and/or

(3) There is no significant downgradient impact and further groundwater treatment is not necessary.

vi. This request should include a report detailing the basis for permanent system shutdown and include all soil, vapor and groundwater data and pulsing information generated by the above evaluation.

(1) The DER is to be notified when soil sampling will occur and may require duplicate sample(s) for independent analysis.

(2) Approval for permanent system shutdown will be provided by the DER, if shutdown conditions have been demonstrated.

(c) The determination that MNA has completely remediated the site in a manner that is fully protective of all identified sensitive receptors and that monitoring can be terminated, is defined as follows:

1. No further monitoring may be required for groundwater if:

i. Contaminant levels in the sentinel well do not exceed the applicable SCGs at any time during the monitoring program. The sentinel well is a well downgradient from the plume, which shows no impact from the site and which acts as an early detection for the leading edge of the plume from the site being monitored. This presumes that contaminants transported by groundwater have had sufficient time to reach the well, allowing for sorbtive retardation and other hydrogeological processes that may have slowed their migration. A proposal regarding the duration of the monitoring program at the sentinel well should be made by the person responsible for conducting the investigation and/or remediation, based upon site-specific data; and

ii. The contaminant plume length has been demonstrated to be stable or shrinking by sufficient and suitable groundwater monitoring. This requires concentration versus distance trend analysis, with suitable statistical validation, with the test applied to each individual contaminant detected in each monitoring well; and,

iii. The contaminant concentrations along the centerline of the plume have been demonstrated to be decreasing by sufficient and suitable groundwater monitoring. This requires concentration versus time trend analysis, with suitable statistical validation, with the test applied to each individual contaminant detected in each monitoring well and a demonstration that groundwater standards are met before reaching the compliance point identified in the decision document.

2. Additional monitoring is required if:

i. Contaminant levels in the sentinel well exceed the applicable SCGs;

ii. The plume length is shown to be increasing, based upon the analysis performed pursuant to (c) 1.ii. above;

iii. Contaminant levels, for individual contaminants, are not decreasing in any area of concern monitoring well in accordance with (c) 1. iii above; or

iv. Sensitive receptors, not previously identified, are threatened.

3. Proposals to sample the monitoring wells at a decreased frequency for the purpose of monitoring the effectiveness of the remedy will be considered by the DER if:

i. Contaminant levels in the sentinel well do not exceed the applicable SCGs at any time during the monitoring program. A proposal regarding the duration of the monitoring program at the sentinel well may be submitted by the person responsible for conducting the remediation, based upon site-specific data;

ii. The contaminant levels detected in the plume, or monitoring wells at the edge of the plume, are reflective of the contaminant levels predicted by the groundwater flow/contaminant transport model;

iii. Contaminant levels above the applicable remediation SCGs remain, but a decreasing trend of contaminant levels is demonstrated in, at a minimum, the area-of-concern monitoring well(s). The decreasing trend should be demonstrated by a suitable statistical evaluation which should be applied to each of the individual contaminants detected in each monitoring well;

iv. Groundwater sample data should not be averaged for the purpose of statistical validation; and

v. Alterative non-parametric statistical tests may be proposed; the DER will determine the acceptability of such tests on a case-by-case basis.

(d) The decision to consider whether it is appropriate to discontinue plume management monitoring is only appropriate under the following circumstances.

1. No further monitoring may be required if:

i. It has been satisfactorily demonstrated that the contaminant plume is discharging into a body of water with sufficient assimilative capacity to ensure that there is no threat to fish and wildlife, the environment or public health.

ii. It has been satisfactorily demonstrated that the plume has reached a stable length beyond which it is incapable of impacting the sensitive receptors identified in the decision document. This condition must be demonstrated with statistically validated and properly calibrated contaminant fate and transport modeling.

2. The decision that a plume management strategy is no longer acceptable and another remedy is required occurs under the following circumstances:

i. The predictive model cannot be verified or calibrated with the field data from the monitoring well network;

ii. Field data indicates that there is a threat to a sensitive receptor identified in the decision document;

iii. A sensitive receptor not previously identified is threatened;

iv. The contaminant has degraded to daughter products which are more mobile or hazardous than the parent compound; or

v. A practicable remedy, not previously available, is identified.

(e) The determination that continued operation of a drinking water treatment system is no longer necessary to provide potable water, and the system can be shut down, is defined by the following evaluation of system performance.

1. Operation of water treatment systems installed in response to actual or potential contamination of a drinking water supply may be terminated or removed when:

i. A clean alternative water supply is provided;

ii. The person responsible for the investigation and/or remediation has:

(1) Identified the source of the contamination;

(2) Accurately and completely delineated, with respect to the impacted water supply, the location and direction of the contaminant plume, and;

(3) Addressed the source of the contamination with an appropriate remedial action; or

iii. Contaminant concentrations in the water supply influent:

(1) Remain at or below drinking water standards for four consecutive quarters;

(2) Followed by concentrations at or below 50% of the State drinking water standards for four

additional consecutive quarters, and;

(3) No taste and/or odors are attributable to the site contamination.

iv. Sampling frequency and duration can be reduced or extended, subject to local regulations, with the approval of the NYSDOH.

2. The person responsible for conducting the remediation must provide the request for shut-down or removal in writing to the DER. The request should include all appropriate documentation supporting a decision for shut-down or removal based on one or more of the criteria identified in (e)1 above.

6.7 Site Closeout

(a) Site closeout occurs when all investigation and/or remediation has been completed and the DER no longer has any oversight responsibility for the site, e.g., monitoring, inspections, etc., in accordance with section 1.2 (b). Site closeout may be initiated by the person responsible for the investigation and/or remediation of a site when the following have been met:

1. When the conditions of section 6.6 have been met for all remedial processes, including:

i. Treatment systems in accordance with section 6.6(b);

ii. MNA in accordance with section 6.6(c);

iii. PMM in accordance with section 6.6(d);

iv. Drinking water treatment in accordance with section 6.6(e), and;

v. Other monitoring or maintenance not listed above, on a case-by-case basis.

2. When it has been determined pursuant to the annual project evaluation, performed in accordance with section 6.4 (a) that institutional and /or engineering controls are no longer necessary.

(b) Site closeout consists of conducting a final project evaluation and preparing a final report consistent with the annual project evaluation described in section 6.4 (a). The final report must include data tables and graphs which illustrate that the conditions of section 6.6 have been satisfied.

(c) Upon review and approval of the final project evaluation report by the DER, the remedial process can be discontinued and the site is considered closed out.

SECTION 7 STANDARDS, CRITERIA, AND GUIDANCE

7.1 Applicability

(a) The standards, criteria, and guidance (SCGs) contained in this section are intended to apply to the person responsible for conducting the investigation and/or remediation, unless good cause exists why conformity with particular SCGs should be dispensed with.

(b) An index to potentially applicable SCGs is contained in appendix 7A, which lists of some of the SCGs potentially applicable to site investigation and remediation activities conducted in New York State. This list is not meant to be comprehensive, nor is it meant to imply that all of them are appropriate for every investigation or remediation conducted.

(c) The person conducting the investigation and/or remediation must comply with other Federal and State SCGs, if applicable to the site.

7.2 Definition and list of acronyms

(a) As defined in section 1.3, SCGs are promulgated requirements and non-promulgated guidance which govern site activities and are used by the DER and other decision makers at various stages in the investigation and remediation of a site.

1. Standards and criteria are New York State regulations or statutes. They are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations which are generally applicable, consistently applied, and officially promulgated under federal or State law that are either directly applicable to a contaminant, remedial action, location, or other circumstance, or that are not directly applicable but are relevant and appropriate.

2. Guidance includes non-promulgated criteria and guidance that are not legal requirements; however, those responsible for investigation and/or remediation of the site should consider guidance that, based on professional judgment, are determined to be applicable to the site.

3. Non-promulgated guidance or criteria, as set forth in (a) 2 above, which when referenced in an oversight document, is enforceable and must be complied with as if it were a promulgated standard.

(b) Acronyms. The following is a list of acronyms used in this section and the guidance document.

1. "CFR" stands for the Code of Federal Regulations
2. "NYCRR" stands for the Official Compilation of New York Code, Rules and Regulations.
3. "OSWER" stands for the USEPA Office of Solid Waste and Emergency Response
4. "PWS" stands for Public Water Supply
5. "RCRA" stands for the Resource Conservation and Recovery Act
6. "SCGs" stands for standards, criteria and guidance
7. "SPDES" stands for State Pollutant Discharge Elimination System
8. "SPOTS" stands for Spill Prevention Operational and Technical Series.
9. "STARS" stands for Spill Technology and Remediation Series
10. "TAGM" stands for Technical and Administrative Guidance Memorandum.
11. "TOGS" stands for Technical and Operational Guidance Series.
12. "UIC" stands for Underground Injection Control
13. "USC" stands for United States Code
14. "USEPA" stands for United States Environmental Protection Agency

7.3 Exemptions from obtaining Department issued permits

(a) The person responsible for conducting the investigation and/or remediation pursuant to this guidance, under an oversight document described in section 1.2 (b), may be exempted from a requirement to obtain any permits for site activities issued by the Department, which otherwise would require a permit, provided the following criteria are met:

1. The activity is on the site. For purposes of this guidance an activity is on site if:

   i. It is conducted on the same premises as the site, or

   ii. It is conducted on different premises that are under common control or are contiguous to or physically connected with the site and the activity manages exclusively waste for which the responsible party is liable; and

2. The activity satisfies all substantive technical requirements applicable to like activity conducted pursuant to a permit as determined by the DER; and

3. The activity is a component of a program selected by a process complying with the public participation requirements of section 1.10, to the extent applicable.

(b) A list of permits which meet the criteria in (a) above and are typically exempted by the Department for investigation and remedial activities is included as Appendix 7B.

(c) The person conducting the investigation and/or remediation must obtain or other wise comply with any other Federal and State permits which may be required to complete the investigation and/or remediation.

7.4 SCGs for site characterization and remedial investigation

(a) The following standards and criteria typically will apply to site characterizations and remedial investigations conducted in accordance with section 3:

1. 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes
2. 6 NYCRR Part 375 - Inactive Hazardous Waste Disposal Sites (January 1998)
3. 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
4. 6 NYCRR Part 182 - Endangered & Threatened Species of Fish & Wildlife
5. 6 NYCRR Part 608 - Use and Protection of Waters
6. 6 NYCRR Part 661 - Tidal Wetlands - Land Use Regulations
7. 6 NYCRR Part 664 - Freshwater Wetlands Maps and Classification
8. 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
9. 6 NYCRR Part 257 - Air Quality Standards
10. 10 NYCRR Part 5 of the State Sanitary Code - Drinking Water Supplies (May 1998)
11. 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
12. 6 NYCRR Part 175 - Special Licenses and Permits--Definitions and Uniform Procedures

(b) The following guidance typically applies to site characterizations and remedial investigations conducted in accordance with section 3:

1. TAGM 4007 - Phase II investigation Generic Workplan (May 1988)
2. TAGM 4015 - Policy Regarding Alteration of Groundwater Samples Collected for Metals Analysis (Sep 1988)
3. TAGM 4018 - Phase I investigations (Nov 1988)
4. TAGM 4032 - Disposal of Drill Cuttings (November 1989)
5. TAGM 4046 - Determination of Soil Cleanup Objectives and Cleanup Levels (January 1994)

6. TAGM 4048 - Interim Remedial Measures - Procedures (December 1992)
7. STARS #1 - Petroleum-Contaminated Soil Guidance Policy
8. SPOTS #14 - Site Assessments at Bulk Storage Facilities (August 1994)
9. TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations
10. Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (October 1994)
11. Technical Guidance for Screening Contaminated Sediments (January 1999)
12. Niagara River Biota Contamination Project: Fish Flesh Criteria for Piscivorus Wildlife (July 1987)
13. Wildlife Toxicity Assessment for Cadmium in Soils (May 1999)
14. Air Guide 1 - Guidelines for the Control of Toxic Ambient Air Contaminants
15. The 10 ppt Health Advisory Guideline for 2,3,7,8-TCDD in Sportfish Flesh
16. The 1 ppm Health Advisory Guideline for Cadmium in Sportfish Flesh
17. Criteria for the Development of Health Advisories for Sportfish Consumption

7.5 SCGs for remedy selection

(a) The following standards and criteria typically apply to the remedy selection process conducted in accordance with section 4:

1. 6 NYCRR Part 375 - Inactive Hazardous Waste Disposal Sites (as amended January 1998)
2. 6 NYCRR Part 376 - Land Disposal Restrictions
3. 6 NYCRR Part 608 - Use and Protection of Waters
4. 6 NYCRR Part 661 - Tidal Wetlands - Land Use Regulations
5. 6 NYCRR Part 662 - Freshwater Wetlands - Interim Permits
6. 6 NYCRR Part 663 - Freshwater Wetlands - Permit Requirements
7. 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
8. 19 NYCRR Part 600 - Waterfront Revitalization and Coastal Resources

(b) The following guidance typically applies to the remedy selection process conducted in accordance with section 4:

1. TAGM 4030 - Selection of Remedial Actions at Inactive Hazardous Waste Sites (May 1990)
2. TAGM 4044 - Accelerated Remedial Actions at Class 2, Non-RCRA Regulated Landfills (March 1992)
3. TAGM 4051 - Early Design Strategy (August 1993)
4. Citizen Participation in New York's Hazardous Waste Site Remediation Program: A Guidebook (June 1998)
5. TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
6. Freshwater Wetlands Regulations - Guidelines on Compensatory Mitigation (October 1993)
7. Air Guide 1 - Guidelines for the Control of Toxic Ambient Air Contaminants

7.6 SCGs for underground storage tank closure

(a) The following standards and criteria typically apply to UST closures conducted in accordance with section 5.5:

1. 6 NYCRR Part 612 - Registration of Petroleum Storage Facilities (February 1992)
2. 6 NYCRR Part 613 - Handling and Storage of Petroleum (February 1992)
3. 6 NYCRR Part 614 - Standards for New and Substantially Modified Petroleum Storage Tanks (February 1992)
4. 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)
5. 6 NYCRR Subpart 374-2 - Standards for the Management of Used Oil (November 1998)
6. 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
7. 40 CFR Part 280 - Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks

(b) The following guidance typically applies to UST closures conducted in accordance with section 5.5:

1. STARS #1 - Petroleum-Contaminated Soil Guidance Policy
2. STARS #2 - Biocell and Biopile Designs for Small-Scale Petroleum-Contaminated Soil Projects
3. SPOTS #14 - Site Assessments at Bulk Storage Facilities (August 1994)
4. Spill Response Guidance Manual
5. Permanent Closure of Petroleum Storage Tanks (July 1988)
6. TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
7. TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations
8. Air Guide 1 - Guidelines for the Control of Toxic Ambient Air Contaminants
9. NYSDOH Environmental Health Manual CSFP-530 - "Individual Water Supplies - Activated Carbon Treatment Systems"

7.7 SCGs for remedial action

(a) The following standards and criteria typically apply to remedial actions conducted in accordance with section 5:

1. 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response
2. 40 CFR Part 144 - Underground Injection Control Program
3. 10 NYCRR Part 67 - Lead
4. 12 NYCRR Part 56 - Industrial Code Rule 56 (Asbestos)
5. 6 NYCRR Part 175 - Special Licenses and Permits--Definitions and Uniform Procedures
6. 6 NYCRR Part 361 - Siting of Industrial Hazardous Waste Facilities
7. 6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)
8. 6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
9. 6 NYCRR Subpart 373-4 - Facility Standards for the Collection of Household Hazardous Waste and Hazardous Waste from Conditionally Exempt Small Quantity Generators (November 1998)
10. 6 NYCRR Subpart 374-1 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)
11. 6 NYCRR Subpart 374-3 - Standards for Universal Waste (November 1998)
12. 6 NYCRR Part 375 - Inactive Hazardous Waste Disposal Sites (as amended January 1998)
13. 6 NYCRR Part 376 - Land Disposal Restrictions
14. 19 NYCRR Part 600 - Waterfront Revitalization and Coastal Resources
15. 6 NYCRR Part 608 - Use and Protection of Waters
16. 6 NYCRR Part 661 - Tidal Wetlands - Land Use Regulations
17. 6 NYCRR Part 662 - Freshwater Wetlands - Interim Permits
18. 6 NYCRR Part 663 - Freshwater Wetlands - Permit Requirements
19. 6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
20. 6 NYCRR Part 750 through 758 - Implementation of NPDES Program in NYS ("SPDES Regulations")

(b) The following guidance typically applies to remedial actions conducted in accordance with section 5:

1. TAGM 4013 - Emergency Hazardous Waste Drum Removal/ Surficial Cleanup Procedures (March 1996)
2. TAGM 4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites (Oct 1989)
3. TAGM 4032 - Disposal of Drill Cuttings (November 1989)
4. TAGM 4046 - Determination of Soil Cleanup Objectives and Cleanup Levels (January 1994)
5. TAGM 4048 - Interim Remedial Measures - Procedures (December 1992)
6. TAGM 4059 - Making Changes To Selected Remedies (May 1998)

7. STARS #1 - Petroleum-Contaminated Soil Guidance Policy
8. STARS #2 - Biocell and Biopile Designs for Small-Scale Petroleum-Contaminated Soil Projects
9. TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
10. Citizen Participation in New York's Hazardous Waste Site Remediation Program: A Guidebook (June 1998)
11. TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations
12. TOGS 1.3.8 - New Discharges to Publicly Owned Treatment Works
13. TOGS 2.1.2 - Underground Injection/Recirculation (UIR) at Groundwater Remediation Sites
14. Air Guide 1 - Guidelines for the Control of Toxic Ambient Air Contaminants
15. State Coastal Management Policies
16. Solidification/Stabilization and its Application to Waste Materials
17. OSWER Directive 9200.4-17 - Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (November 1997)
18. NYSDOH Environmental Health Manual CSFP-530 - "Individual Water Supplies - Activated Carbon Treatment Systems"

7.8 SCGs for operation, maintenance and monitoring

(a) The following standards and criteria typically apply to operation and maintenance activities conducted in accordance with section 7:

1. 6 NYCRR Part 175 - Special Licenses and Permits--Definitions and Uniform Procedures

(b) The following guidance typically applies to operation and maintenance activities conducted in accordance with Section 7:

1. Groundwater Monitoring Well Decommissioning Procedures (May 1995)

2. The activity is a component of a program selected by a process complying with the public participation requirements of section 1.10, to the extent applicable.

3. NYSDOH Environmental Health Manual CSFP-530 - "Individual Water Supplies - Activated Carbon Treatment Systems"

APPENDIX 1A

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

APPENDIX 2A

Quality Assurance Officer Guidelines

The Quality Assurance Officer (QAO) is an employee of the same consulting firm generating the work plan and acts in conjunction with the project manager to develop a site-specific quality assurance plan The QAO must not have another position on the project, such as a project or task manager, that involves project productivity or profitability as a job performance criteria

The project QAO must have a minimum of a bachelors degree in chemistry or natural science with a minimum of 20 hours in chemistry.

The QAO must be proficient in analytical methodology, data interpretation and validation, the development of sampling plans, quality control procedures and auditing techniques.

The QAO will assist the project manager in the development of the sampling and analytical portion of the Quality Assurance Project Plan. The QAO or his/her designee shall conduct periodic field and sampling audits, interface with the analytical laboratory to make requests and resolve problems, interface with the data validator and develop a project specific data usability report. Because on-site work may be necessary, verification of completion of the 40 hour OSHA safety training course and 8 hour refresher is required.

APPENDIX 2B

Guidance for the Development of Data Usability Summary Reports

Background:

The Data Usability Summary Report (DUSR) provides a thorough evaluation of analytical data without the costly and time consuming process of third party data validation. The primary objective of a DUSR is to determine whether or not the data, as presented, meets the site/project specific criteria for data quality and data use.

The DUSR and the data deliverables package will be reviewed by the DER Quality Assurance Unit. If data validation is found to be necessary (e.g. pending litigation) this can be carried out at a later date on the same data package used for the development of the DUSR.

Personnel Requirements:

The Environmental Scientist preparing the DUSR must hold a Bachelors Degree in a relevant natural or physical science or field of engineering and must submit a resume to the Division's Quality Assurance Unit documenting experience in environmental sampling, analysis and data review.

Preparation of a DUSR:

The DUSR is developed by reviewing and evaluating the analytical data package. During the course of this review the following questions must be asked and answered:

1. Is the data package complete as defined under the requirements forthe NYSDEC ASP Category B or USEPA CLP deliverables?

2. Have all holding times been met?

3. Do all the QC data: blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?

4. Have all of the data been generated using established and agreed upon analytical protocols?

5. Does an evaluation of the raw data confirm the results provided in the data summary sheets and quality control verification forms?

6. Have the correct data qualifiers been used?

Evaluation of NYSDEC ASP Matrix Spike Blank (MSB) data - If the MSB recovery is less that the ASP criteria, the positive results should be qualified as J, estimated biased low. If the MSB recovery is less than the ASP criteria, but greater than 10%, the nondetects should be qualified J, biased low. If the MSB recovery is less than 10%, the nondetect data must be rejected.

Any Quality Control exceedances must be numerically specified in the DUSR and the corresponding QC summary sheet from the data package should be attached to the DUSR. All data that would be rejected by the EPA Region 2 Data Validation Guidelines must also be rejected in the DUSR.

Once the data package has been reviewed and the above questions asked and answered the DUSR proceeds to describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations and quality control problems are identified and their effect on the data is discussed. The DUSR shall also include recommendations on resampling/reanalysis. All data qualifications must be documented following the NYSDEC ASP '95 Rev. guidelines.

APPENDIX 2C

Quality Control Recommendations for Tissue Sampling

Sample Type/Frequency	Analyte Groups	Control Limits	Corrective Actions
Calibration standards (minimum of 3 over expected range of sample analyte concentrations with lowest near MDL); Freq. = Once daily minimum; 1/15 samples if 15 or more samples analyzed daily	Organics Metals	RSD of RFs of calibration standards ≤ 20 percent % R of all calibration standards = 95 to 105	Determine cause of problem (e.g., instrument instability or malfunction, contamination, inaccurate preparation of calibration standards); take appropriate corrective action; recalibrate and reanalyze all suspect samples, or flag all suspect data.
Blanks (method, processing, reagent, or matrix); Freq. = 1/15 samples as appropriate for analytical paramenters being determined	Organics and metals	Concentration of any analyte <MDL or MQL, as determined by program manager	Determine cause of problem (e.g., contaminated reagents, solvents, or equipment); remove any sources of contamination; reanalyze all suspect samples, or flag all suspect data.
Matrix spikes; Freq. = 1/15 samples	Organics Metals	% R≥70 with good precision % R = 75 to 125	Determine cause of problem (e.g., incomplete extraction or digestion, contamination); take appropriate corrective action; reanalyze all suspect samples, or flag all suspect data. Zero percent recovery requires rejection of all suspect data.
Reference materials; Freq. = 1/15 samples	Organics Metals	Measured value within 95% confidence intervals, if certified. Otherwise, % R = 70 to 130 % R = 85 to 115	Determine cause of problem (e.g., inaccurate calibration, contamination); take appropriate corrective action; reanalyze all suspect samples, or flag all suspect data.
Laboratory replicates; Freq. = 1/15 samples if conducted without analytical replicates, 1/30 samples if conducted with analytical replicates	Organics Metals	A difference no more than a factor of two (approximately a 50% coefficient of variation) |RPD| ≤ 20 for duplicates	Determine cause of problem (e.g., composite sample not homogenous, instrument instability or malfunction); take appropriate corrective action; reanalyze all suspect samples, or flag all suspect data.

Sample Type/Frequency	Analyte Groups	Control Limits	Corrective Actions
Analytical replicates; Freq. = 1/15 if conducted without laboratory replicates, 1/30 samples if conducted with laboratory replicates	Metals	Determined by program manager	Determine cause of problem (e..g., instrument instability or malfunction); take appropriate corrective action; reanalyze sample.
Surrogate spikes (or internal controls) - surrogate compounds; Freq. = with each sample	Chlorinated dioxins and furans, PAHs	Determined by program manager	Determine cause of problem (e.g., incomplete extraction or digestion, contamination, inaccurate preparation of surrogates); take appropriate corrective action; reanalyze all suspect samples, or flag all suspect data.
Accuracy-based performance evaluation samples; Freq. = at discretion of Project Quality Assurance Officer, minimum of one set of samples	Organics Metals	% R = 70 to 130 % R = 85 to 115	Determine cause of problem. Do not begin or continue analysis of samples until laboratory capability is clearly demonstrated.

APPENDIX 3A

Records Search Requirements

The first phase of a site characterization should be a records search based on diligent inquiry and include an evaluation of the following:

1. Historical information concerning the site history should be part of the site assessment. Historical information is not required if the investigation is directed at either a specific discharge event (rather than a particular area of concern) or any underground tank or underground tank system unless directed by the Department. The site history should include an evaluation of the following to the extent available from diligent inquiry:

i. Site history information from sources including, but not limited to, the following:

(1) Sanborn Fire Insurance Maps;

(2) MacRae's Industrial Directory;

(3) Title and Deed;

(4) Site plans and facility as-built drawings;

(5) Federal, State, county and local government offices; and

(6) Department Geographic Information System;

(7) Adjacent property uses

ii. The industrial/commercial site history from the time the site was naturally vegetated or utilized as farmland, including without limitation:

(1) Names of all owners and operators;

(2) Dates of ownership of each owner;

(3) Dates of operation of each operator; and

(4) Brief descriptions of the past industrial/commercial usage of the site by each owner and operator;

iii. All raw materials, finished products, formulations and hazardous substances, hazardous wastes, and petroleum products which are or were present on the site, including intermediates and by-products;

iv. Present and past production processes, including dates, and their respective water use should be identified and evaluated, including ultimate and potential discharge and disposal points and how and where materials are or were received onsite (for example, rail, truck);

v. All former and current containers, container or bulk storage areas, above and below ground tanks, above and below ground waste and product delivery lines, surface impoundments, landfills, septic systems and other structures, vessels, conveyances or units that contain or previously contained hazardous substances, hazardous waste, and petroleum products, including:

(1) Type;

(2) Age;

(3) Dimension of each container;

(4) Location;

(5) Chemical content;

(6) Integrity (for example, tank test reports);

(7) Volume;

(8) Construction materials; and

(9) Inventory control records to include records of leak detection system inspections, where there is no discharge history;

vi. An interpretation of the aerial photographic history of the site, based on available current and historical color, black and white and infrared aerial photographs (scale 1:17.,000 or less) of the site and surrounding area at a frequency which provides the evaluator with a historical perspective of site activities. The photographic history should date back to 1932 or to the earliest photograph available.

vii. Any data or information concerning known discharges that have occurred on the site;

viii. Remediation activities previously conducted or currently underway at the site including dates of previous discharges, remedial actions, and all existing sampling data concerning contaminants at the site. If a government agency was involved, the name of the lead government agency, case identification number, and current case status;

ix. All remedies previously approved by the Department in a remedial action work plan or decision document to determine if the remedy remains protective of human health and the environment;

x. All existing environmental sampling data concerning contaminants at the site;

xi. Any known changes in site conditions or new information developed since completion of previous sampling or remediation;

xii. All Federal, State and local environmental permits including permits for all previous and current owners or operators, applied for or received, or both, for the site including:

(1) The name and address of permitting agency;

(2) The reason for the permit;

(3) The permit identification number;

(4) The application date;

(5) The date of approval, denial, or status of application;

(6) The name and current address of all permittees;

(7) The reason for denial, revocation or suspension if applicable; and

(8) The permit expiration date;

xiii. All administrative, civil and criminal enforcement actions for alleged violations of environmental laws concerning the site, including:

(1) The name and address of agency that initiated the enforcement action;

(2) The date of the enforcement action;

(3) The section of statute, rule or permit allegedly violated;

(4) The type of enforcement action;

(5) A description of alleged violations; and

(6) The resolution or status of violation and enforcement action.

(7) A description of any potential environmental impact which may have resulted from the alleged violation; and

xiv. All areas where non-indigenous fill materials were used to replace soil or raise the topographic elevation of the site, including the dates of emplacement, where reasonably available, paying particular attention to potential areas of concern as identified in section 1.7..

2. The person conducting the records search should conduct a site visit to verify the findings in (c)1 above. Where site conditions are not already well known, appropriate monitoring instruments such as Organic Vapor Analyers (Photo Ionization Detectors, explosimeters), oxygen detectors and radiation detectors should be used to assure personal safety and assist with site characterization.

3. Interviews are to be utilized, where appropriate, taking into consideration the following factors relative to who to interview, how and when they should be conducted:

i. Interviews with facility personnel (past and present), adjoining property owners, and persons familiar with past activities at the site can be useful in determining if and where hazardous waste/substances, or petroleum products were disposed of at the site and what exposure pathways are likely to be at risk. Information obtained during the interview process can supplement other means used in the investigation. However, if the information is crucial to the determination that hazardous waste/substances or petroleum products were disposed of at the site, the documentation outlined in 3.iv (below) is required.

ii. Interviews may be conducted in person, by telephone, email or post.

iii. Interviews may be conducted prior to, during or after the site reconnaissance, as convenient to the project manager.

iv. Interviews must be documented with the date and signature of the person granting the interview. At the end of the interview the person should read and be asked then and there to sign and date the transcript. In cases where a telephone interview was conducted, the project manager should determine during that conversation if the person is willing to sign his/her statements. If so, the project manager will send a transcript to that person for signature thus verifying the conversation. In the case where the person interviewed is unwilling to sign a transcript, or the consultant, after making a reasonable effort (mailing a transcript with a follow-up letter requesting the return), is unable to obtain the person's signature on the transcript, then this statement should not be

used or referenced in the report. The person's name, however should be listed in the references section of the report as being contacted during the investigation.

v. Areas of inquiry should include the following:

(1) Any pending or past litigation or administrative proceedings regarding hazardous waste/substances or petroleum products on the site;

(2) Any notices from any government agency regarding any possible violation of environmental or safety laws;

(3) Previous environmental assessments or audits;

(4) Environmental permits or registrations;

(5) Safety plans, prevention plans, control plans;

(6) Reports describing local hydrogeologic conditions.

vi. People to interview should include:

(1) Pertinent Department and DOH staff;

(2) Past owners, occupants and operators, key managers, former employees;

(3) Site neighbors; and

(4) Local officials, such as elected officials, attorneys, building inspectors; zoning board, planning board, as well as any fire police, health, engineering and environmental departments.

vii. Evaluation of interview responses should include the following factors:

(1) Degree of specificity;

(2) Degree of interviewee's knowledge;

(3) Degree of interviewee's good faith;

(4) Completeness;

(5) Documentation; and

(6) Corroboration.

APPENDIX 3B

New York State Department of Health
Qualitative Human Health Exposure Assessment

A qualitative exposure assessment consists of characterizing the exposure setting (including the physical environment and potentially exposed human populations), identifying exposure pathways, evaluating contaminant fate and transport.

An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: (1) a contaminant source; (2) contaminant release and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population.

The source of contamination is the source of contaminant release to the environment (any waste disposal area or point of discharge); if the original source is unknown, it is the environmental medium (soil, air, biota, water) at the point of exposure. Contaminant release and transport mechanisms carry contaminants from the source to points where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (i.e., ingestion, inhalation, dermal absorption). The receptor population is the people who are or may be exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway are documented; a potential exposure pathway exists when any one or more of the five elements comprising an exposure pathway is not documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future.

To perform a qualitative exposure assessment, site conditions are characterized to evaluate whether a site poses an existing or potential hazard to the exposed or potentially exposed population. Site characterization involves a review of sampling data for environmental media (e.g., soil, surface water, groundwater, air), both on-site and off-site, and an evaluation of the physical conditions of the contaminant sources or physical hazards near the site which may pose an additional health risk to the community.

Site contaminants are reviewed, and those selected for further evaluation are identified based upon consideration of the following factors:

Concentrations of contaminants in environmental media both on-site and off-site;

Field data quality, laboratory data quality and sampling design; and,

Comparison of on-site and off-site contaminant concentrations in environmental media with typical background levels

November 9, 2000

APPENDIX 3C

Fish and Wildlife Resources Impact Analysis Decision Key

		If YES Go to:	If NO Go to:
1.	Is the site or area of concern a discharge or spill event?	13.	2.
2.	Is the site or area of concern a point source of contamination to the groundwater which will be prevented from discharging to surface water? Soil contamination is not widespread, or if widespread, is confined under buildings and paved areas.	13.	3
3.	Is the site and all adjacent property a developed area with buildings, paved surfaces and little or no vegetation?	4.	9.
4.	Does the site contain habitat of an endangered, threatened or special concern species?	Section 3.10.1	5.
5.	Has the contamination gone off site?	6.	14.
6.	Is there any discharge or erosion of contamination to surface water or the potential for discharge or erosion of contamination?	7.	14.
7.	Are the site contaminants PCBs, pesticides or other persistent, bioaccumulable substances?	Section 3.10.1	8.
8.	Does contamination exist at concentrations that could exceed SCGs or be toxic to aquatic life if discharged to surface water?	Section 3.10.1	14.
9.	Does the site or any adjacent or downgradient property contain any of the following resources? a. Any endangered, threatened or special concern species or rare plants or their habitat b. Any NYSDEC designated significant habitats or rare NYS Ecological Communities c. Tidal or freshwater wetlands d. Stream, creek or river e. Pond, lake, lagoon f. Drainage ditch or channel g. Other surface water feature h. Other marine or freshwater habitat i. Forest j. Grassland or grassy field k. Parkland or woodland l. Shrubby area m. Urban wildlife habitat n. Other terrestrial habitat	11.	10.
10.	Is the lack of resources due to the contamination?	Section 3.10.1	14.
11.	Is the contamination a localized source which has not migrated and will not migrate from the source to impact any on-site or off-site resources?	14.	12.
12.	Does the site have widespread soil contamination that is not confined under and around buildings or paved areas?	Section 3.10.1	13.
13.	Does the contamination at the site or area of concern have the potential to migrate to, erode into or otherwise impact any on-site or off-site habitat of endangered, threatened or special concern species or other fish and wildlife resource? (See #9 for list of potential resources. Contact NYSDEC for information regarding endangered species.)	Section 3.10.1	14.
14.	No Fish and Wildlife Resources Impact Analysis needed.		

APPENDIX 3D

THE SITE CONCEPTUAL MODEL PROCESS

What is a Conceptual Model?

The site conceptual model process is an important framework used to guide the analysis of chemicals of concern in the environment. The process requires that hypotheses are made concerning contaminant fate and transport scenarios as well as potential impacts to sensitive receptors. This approach tends to focus and expedite an investigation. There are often several competing conceptual models during the early phases of an investigation. As the investigation proceeds some working hypotheses will be disproved and ultimately discarded. Those that remain guide decisions on further sampling. The surviving conceptual model is eventually refined to a point where all new data can be accommodated without additional modifications. When this point is reached, the conceptual model should be formalized and included in the investigation report.

A well defined site conceptual model identifies and describes: (1) the sources of contamination, (2) the nature and extent of the contamination, (3) the dominant fate and transport characteristics of the site, (4) potential exposure pathways, and (5) potentially impacted receptors. is a description of what has happened, what will happen and what the resulting impacts will be. The information is often expressed in the form of a case narrative, similar to a detailed executive summary. Many choose to supplement the narrative with a diagrammatic version of the conceptual model.

Section 3 describes a variety of data collection activities that will take place during the characterization of most sites remediated under this process. The products of these activities are all elements to be considered in the conceptual model.

Example Conceptual Model:

A release of diesel fuel has occurred over a number of years at a trucking facility in an industrial area of Gotham City. Unlike most of Gotham, this area is dependent on local groundwater for public supply. Although all underground storage tanks passed tightness testing, leaks associated with the dispenser islands went undetected for many years. Owing to the large throughput of the fueling system (100,000 gallons per day), inventory discrepancies were not noticed until statistical reconciliation was installed to meet the 1998 Federal Regs. XYZ Environmental estimates that the system had been experiencing a 1% operational loss of fuel per day (duration unknown), which equates to a loss of 1,000 gallons per day. As soon as this was noticed, all dispensers were excavated and repairs made to cut off the flow of new product to the subsurface. The depth to the water table is approximately 15 feet. Groundwater flows to the southwest into Botany Bay, a distance of approximately 1.5 miles. The maximum groundwater gradient is .002 (dimension less) along azimuth 220 (SW). The hydraulic conductivity of the back bay deposits is 50 feet per day. The average linear velocity of groundwater beneath the site is therefore approximately a half a foot per day. The nearest public supply well is 1.2 miles up gradient (northeast) of the site, next to a former munitions plant, and therefore not at risk from this site. An Expedited Site Assessment was performed with a Geoprobe to quickly delineate the free product which was confined primarily to the site and had a maximum thickness of 2.2 feet. Although most of the estimated 50 to 100K gallons of recoverable fuel is contained within the piles upon which the depot is built, free product does extend approximately 110 feet beyond the site boundary from the southwest corner of the building. A mobile GC was used to delineate the dissolved diesel plume which reaches non-detect approximately 50' beyond the extent of the free product. 20 monitoring wells were subsequently installed to monitor both the free product and dissolved plumes. We now have two years worth of quarterly laboratory and monthly M&B data which shows that since the flow of additional diesel was shut off with system repairs, both the free product and dissolved plumes have reached a state of apparent dynamic equilibrium and appear stable. Vertical profiling of the down gradient edge of the plume confirms that the dissolved plume is not diving beneath our monitoring network. The dissolved plume apparently attenuates naturally well before reaching Botany Bay. There are no other known sensitive receptors along the flow path.

APPENDIX 4A

Generic Remedial Action Objectives

GROUNDWATER

RAO's for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of volatiles, from contaminated groundwater.

RAO's for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release condition s , to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

SOIL

RAO's for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil

RAO's for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

SURFACE WATER

RAO's for Public Health Protection

- Prevent ingestion of water impacted by contaminants.
- Prevent contact or inhalation of contaminants from impacted water bodies.
- Prevent surface water contamination which may result in fish advisories.

RAO's for Environmental Protection

- Restore surface water to ambient water quality criteria for the contaminant of concern.
- Prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through the marine or aquatic food chain.

SEDIMENT

RAO's for Public Halth Protection

- Prevent direct contact with contaminated sediments
- Prevent surface water contamination which may result in fish advisories.

RAO's for Environmental Protection

- Prevent releases of (contaminant(s) from sediments that would result in surface water levels in excess of (ambient water quality criteria).
- Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity or impacts from bioaccumulation through the marine or aquatic food chain.

APPENDIX 4B

FWRIA Part 3
Ecological Effects of Remedial Alternatives

When developing and evaluating remedial alternatives, the following considerations should be incorporated into remedy selection, as appropriate.

1. Has the information collected in the FWRIA Part 1 and 2 been incorporated into the development of alternatives?

2. Have actual or potential adverse impacts to fish and wildlife resources been identified?

3. Have contaminants of ecological concern been identified?

4. Have remedial action objectives been established for the contaminants of ecological concern and the protection of the impacted resources?

5. Have ecologically based cleanup levels been identified and the alternatives evaluated in terms of the ability to meet ecologically based cleanup levels?

6. Have the alternatives been evaluated in terms of the expected reduction in the toxicity or bioaccumulation of contaminants?

7. If human health based or other SCGs are proposed as cleanup levels, will the adverse impacts to fish and wildlife resources be eliminated or adequately mitigated?

8. Have alternatives been evaluated in terms of contaminant-related impacts that would remain after implementation?

9. Does the recommended alternative eliminate or adequately mitigate the adverse impacts to fish and wildlife resources? If not, why not?

10. Have applicable resource related SCGs been identified?

11. Have the alternatives been evaluated in terms of the non-contaminant related effects such as temporary and/or permanent loss of, or damage to the resource during implementation?

12. Has the remedial alternative that best maintains or restores fish and wildlife resources been identified? Has an alternative been included that maximizes the acreage of habitat remediated?

13. Has the need for a post-remedial monitoring program (including biological monitoring) been identified? Is a conceptual monitoring program included which can evaluate the long term effectiveness of the remediation?

APPENDIX 4C

Natural Resource Damages (NRD) Checklist

PURPOSE : NRD claims seek the following: to compensate the public for the injury to, loss of, and/or destruction of its natural resources; to assess damages for residual contamination and the attendant natural resource injury which is not addressed by the remedial action; and to assess damages for the past and/or future loss of services which the injured natural resources would have provided. This checklist provides the person responsible for conducting the investigation/remediation with a simplified format for documenting cursory NRD assessment information during the development and evaluation of remedial alternatives. Based on this information, the State or Trustees may further evaluate the site for injury to natural resources according to state and/or federal statutory mandates, (e.g. CERCLA, OPA, and the Clean Water Act).

The State's objective is to minimize injuries to natural resources and provide for the restoration of those resources that have been injured or destroyed by releases of hazardous substances. Because the goals of the remedial program and the NRD program are distinct but interrelated, timely coordination of the two programs can benefit all parties involved. Addressing NRD issues during the remedial process can aid in achieving a more cost-effective clean-up as well as enhance an opportunity for early global settlement with the PRIR. Also, NRD restoration actions can be conducted in a manner consistent with and supportive of the requirements and project schedules established for implementation of the site remedy. With NRD input, remedial alternatives may be selected which reduce residual injury to natural resources and, if feasible, incorporate restoration actions as part of the remedy.

INSTRUCTIONS: Review existing site information and answer the questions in the attached Checklist to the extent possible. Under Natural Resources, if one or more questions are answered with a YES for Surface Water, Groundwater, Biological Resources, or Impacts to Public Use of Natural Resources, the potential for an NRD claim exists. If one or more questions are answered with an UKNOWN, further investigation at the site may be necessary to determine the potential for an NRD claim. If all questions are answered with a NO, the potential for an NRD claim is small.

Survey completed by: _____

Date completed: _____

"Y" = yes; "N" = No

Site Name/PRIR	
Site Location	
Status of Site Remediation (e.g. RI done; remedy selected)	
PRPs (if known)	
Site ID#	

CONTAMINANTS OF CONCERN Types, Classes, or Specific Hazardous Substances Known Or Suspected	CAS CODE	On-site Y/N	Adjacent to or near the site Y/N

OBSERVED IMPACTS ASSOCIATED WITH THE SITE	On-site None, Limited, Extensive	Adjacent to or near the site None, Limited, Extensive
Injury to vegetation		
Injury to wildlife (e.g. large or small animals, birds, other)		
Surface water sheen or discoloration		
Soil stained or giving off odors		
Mortalities of wildlife/ biota observed ?		
Notes of above or other readily observable impacts, (e.g. samples, pictures taken)		

NATURAL RESOURCES	Y	N	U
I. SURFACE WATER			
• Are hazardous substances present in surface waters?			
• Have hazardous substances reached sensitive species or habitats via surface water?			
• Do concentrations of contaminants exceed State/ Federal Ambient Water Quality Criteria (acute/chronic)?			
• Do concentrations of contaminants exceed State/ Federal drinking water standards?			
• Is the affected water body designated as a public drinking water supply?			
• Has surface water contamination or threat of contamination precluded its use as a public water supply ?			
• Has surface water contamination or threat of contamination precluded its use as a source for agricultural, industrial, or other commercial uses?			
• Has contamination, or the threat of contamination, been extensive enough to preclude or limit human contact or water-based recreational activities?			
• Do concentrations of hazardous substances in sediments exceed State or other sediment criteria?			
• Are contamination levels in sediments sufficiently high to create potential for acute/sublethal effects to aquatic receptors (receptors may regularly or incidentally be exposed to sediment) ?			
II. GROUNDWATER			
x Are hazardous substances present in groundwater?			
x Have hazardous substances reached sensitive species or habitats via groundwater migrating into habitats and/or surface waters? (**NOTE:** Contaminants may be taken-up by terrestrial or rooted aquatic plants via roots in contact with groundwater within the root zone (< 1 meter) . Terrestrial wildlife receptors will not contact groundwater unless it reaches the surface.)			
• Are State/Federal standards (MCL's etc.) for groundwater exceeded in existing or abandoned public/private water supply wells?			
• Are existing public/private water supply wells closed to human consumption due to observed or threat of contamination?			
• Are existing wells closed to agricultural, industrial, or other commercial uses due to observed or threat of contamination?			
• Do public/private water supply wells exist within ½ mile radius of the site?			
• Have water supply development plans been altered due to observed or threat of contamination?			
• Is groundwater usable as a drinking water supply without the presence of contamination?			
• Is the groundwater designated as a drinking water aquifer?			
• Is DNAPL present in the aquifer?			

"Y" = yes; "N" = No, "U" = Unknown

NATURAL RESOURCES	Y	N	U
III. BIOLOGICAL RESOURCES: e.g. includes: **Fish and wildlife:** marine & freshwater aquatic and terrestrial species; game, non-game, & commercial species; threatened, endangered, and state sensitive species. **Other biota:** shellfish; terrestrial and aquatic plants; and other living organisms.			
• Are hazardous substances in direct contact with fish, wildlife, or other biota?			
• Are hazardous substances present in prey or food items of wildlife?			
• Is there potential for exposure to wildlife and plants via the following pathways: 1. Direct exposure/physical fouling or coating by direct contact or up-take of haz. substances 2. Direct ingestion or ingestion of contaminated food source 3. Air borne contaminants/respiratory exposure			
• Are the following natural resources present in the affected area: Federal or State Endangered & Threatened Species • and/or Habitats (i.e. wetlands, streams) Migratory Bird Habitat Anadramous Fish Habitat State Species of Special Concern			
• Do concentrations of oil or hazardous substances exceed action or tolerance levels established by the FDA in edible portions of organisms?			
• Do concentrations of oil or hazardous substances exceed State recommended guidance levels in edible portions of organisms?			
x Aquatic Biota: • Has a fisheries closure or advisory been issued? • Have fish, shellfish, or other aquatic organisms been deemed unfit for consumption? • Has acute toxicity (kills of fish, invertebrates, or amphibians, etc.) been observed or reported ? x Have chronic effects (tumors, lesions) been indicated?			
Aquatic Vegetation: (submerged, emergent, or inundated) x Have acute toxicity or sub-lethal chronic effects been observed (e.g. plant mortality, reduced growth)?			
Terrestrial Biota: (birds, mammals, invertebrates) • Have acute toxicity or sub-lethal chronic effects been observed or reported? (e.g. animal deaths, reproduction effects)?			
Terrestrial Vegetation: • Have acute toxicity or sub-lethal chronic effects been observed or reported?			
IV. GEOLOGIC RESOURCES : e.g. Soils, rocks, minerals, including petroleum & natural gas. • Are hazardous substances present in soils?			
• Are geological resources of concern present?			
• Are surface soils contaminated ?			
• Can contaminants become airborne via adherence to dust?			
V. AIR RESOURCES • Have contaminants been released into the air?			
• Are vapors or gases currently being released into the air?			
• Do concentrations of emissions exceed federal or state air standards established for the protection of public welfare or natural resources?			
• Are concentrations and duration of emissions sufficient to potentially cause injury to natural resources?			

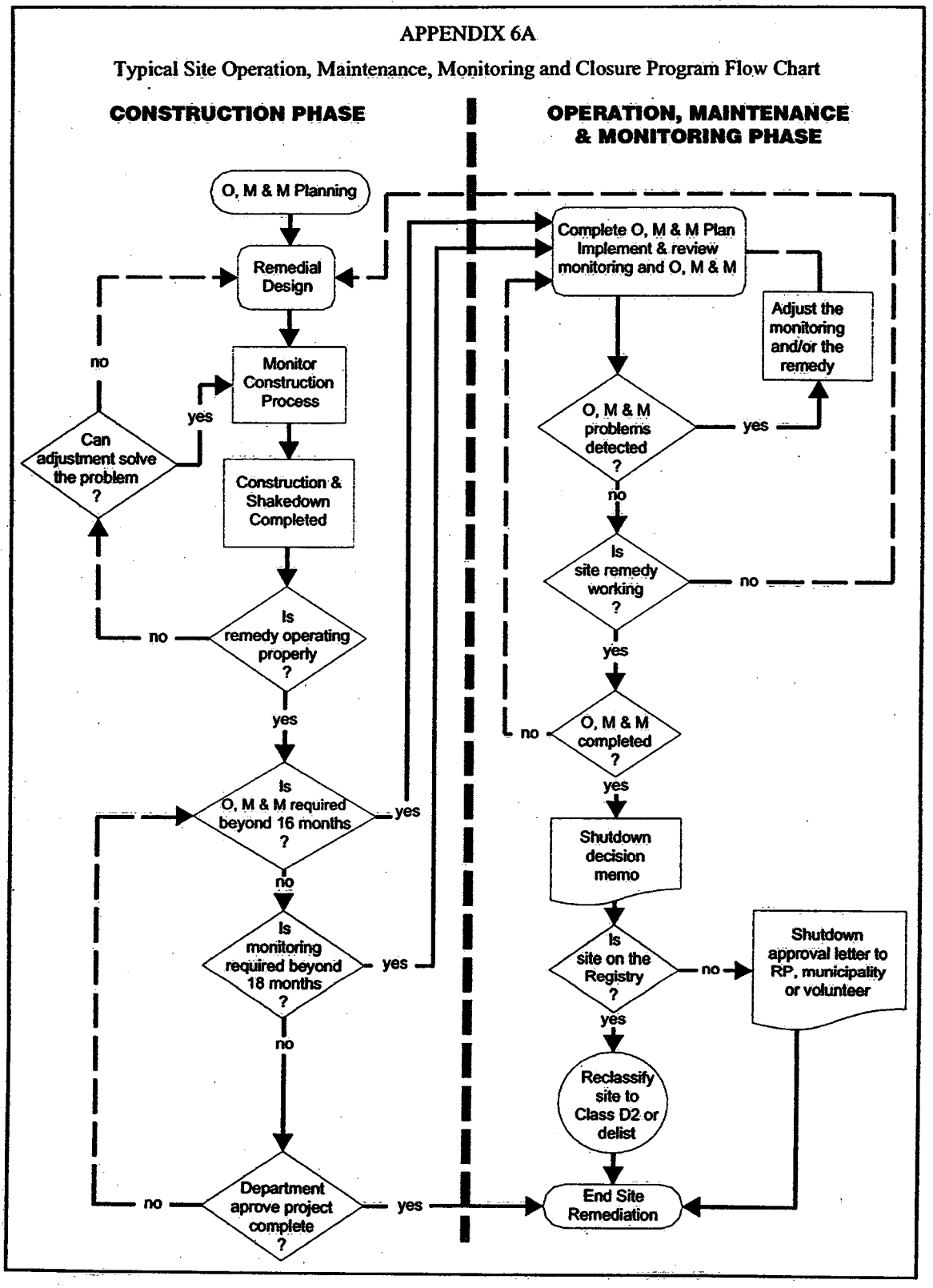
"Y" = yes; "N" = No, "U" = Unknown

NATURAL RESOURCES	Y	N	U
VI. IMPACTS TO PUBLIC USES OF NATURAL RESOURCES • Have releases or potential for releases of hazardous substances caused past or current closures or reduced access to public areas:			
Beach closures?			
Waterway closings to commercial /recreational fisheries ?			
Lost tourism?			
Other closures ? (please describe)			
• Past or current posting of human health or food consumption advisories?			
• Any media coverage of the releases or potential threat of releases?			
VII. NOTIFICATION OF NATURAL RESOURCE TRUSTEES • Has a Natural Resource Trustee been notified about the release or potential release of hazardous substances at this site? If yes:			
Name of State Trustee(s) [agency & person] notified w /date of notification: _____ _____ _____ Name of Federal Trustee(s) [agency & person] notified w/ date of notification: _____ _____ _____ _____ Which Federal/State Trustee(s) will this survey be sent to: Name of Trustee [agency and person] notified : _____ _____ _____ _____			

"Y" = yes; "N" = No, "U" = Unknown

APPENDIX 6A

Typical Site Operation, Maintenance, Monitoring and Closure Program Flow Chart



APPENDIX 6B

Suggested Outline for OM&M Manual

The following is a suggested outline for an OM&M Manual:

Volume I: General Manual (as outlined below)

Volume II: Manufacturer's Catalog-Cuts / Manuals

Volume II consists of all catalog-cuts on all fixed and mobile equipment necessary to operate and maintain the treatment facility, field pumps, leachate collection system, etc. Catalog-cuts include maintenance procedures, spare parts lists, and any special tool requirements, as well as vendor / service contact / local dealer information, including addresses and telephone numbers.

Volume III: Site-Specific Standard Operating Procedures (SOP's)

Volume III is a specific section found necessary based on OM&M site-specific activities and conditions, such as:

i. When the equipment catalog cuts are not detailed enough to perform certain maintenance;

ii. When special replacement parts are required, such as when waste material interferes with manufacturer's gasket material requiring the use of different material and / or more frequent replacement;

iii. when water conditions warrant special maintenance; and

iv. when venting equipment requires special attention.

Outline of Volume I:

The OM&M Manual may include, but not be limited to, the following:

1.0 Introduction
- 1.1 Project
- 1.2 Purpose of OM&M Manual
- 1.3 Special Site-Specific Safety Warnings (do's and don'ts)
- 1.4 Records Management
  - 1.41 OM&M Needs Summary
  - 1.42 OM&M Needs Summary List of Official Records and References

2.0 Site Description
- 2.1 History
- 2.2 Hydrogeology (including well logs)

3.0 Site Remedial Action
- 3.1 Description of Remedial Action
- 3.2 Goals of Remedial Action

4.0 Sampling Analysis
- 4.1 Monitoring Plan

- 4.11 Elements of Monitoring Plan
- 4.12 Basis of Design

4.2 Environmental Effectiveness Monitoring
- 4.21 General
- 4.22 Sampling Program
  - 4.221 Surface Water Sampling & Procedures
  - 4.222 Groundwater Sampling & Procedures
  - 4.223 Leachate Sampling & Procedures
  - 4.224 Gas Monitoring & Procedures
  - 4.225 Sediment Sampling and Procedures
  - 4.226 Biota Monitoring and Procedures
  - 4.227 Wetland or other Habitat Monitoring and Procedures

4.3 On-Site Treatment Plant Performance Monitoring
- 4.31 Influent Sampling and Procedures
- 4.32 Effluent Sampling & Procedures
- 4.33 Discharge Monitoring
- 4.34 Water Level Measurements

4.4 Analytical Program
- 4.41 Analytical Schedules and Methods
- 4.42 Laboratory QC Samples
- 4.43 Reporting and Deliverables
- 4.44 Special Analytical Protocols
- 4.45 Laboratory Audit
- 4.46 Data Audit

4.5 Evaluation of Monitoring Results

4.6 Records

5.0 Site Maintenance

5.1 Maintenance Activities
- 5.101 Site Fence
- 5.102 Signs
- 5.103 Cover
- 5.104 Runoff Control Structures
- 5.105 Settlement & Subsidence Control
- 5.106 Flexible Membrane Liner Repairs
- 5.107 Groundwater Monitoring System
- 5.108 Gas Venting System
- 5.109 Leachate Pumping System
- 5.110 Vehicle Access Road
- 5.111 Vermin and Vector Observations
- 5.112 Treatment Plant Maintenance
- 5.113 Description of Maintenance Requirements of Each Component of the Treatment Facility
- 5.114 Maintenance Schedule

5.2 Inspections and Maintenance
- 5.21 Operating Records
- 5.22 Monthly Check List
- 5.23 Quarterly Check List
- 5.24 Yearly Check List

5.3 Preventive Maintenance Schedules

5.4 Disposal of Used Material and Waste

6.0 Reports
- 6.1 Monthly Reports
- 6.2 Quarterly Reports
- 6.3 Yearly Reports
- 6.4 5-Year Review Report

7.0 Citizen Participation
- 7.1 OM&M Citizen Participation Plan
- 7.2 Contact List
- 7.3 FOIL Packet

8.0 Personnel
- 8.1 Organization
  - 8.1.11 Chain of Command
- 8.2 Manpower Requirements
- 8.3 Responsibilities and Duties
- 8.4 Qualifications
- 8.5 Training (including Health and Safety)
- 8.6 Material Safety Data Sheets

9.0 Health and Safety Plan

10.0 Records and Forms
- 10.1 Operating / Inspection
- 10.2 Monitoring (Environmental and Hydrogeological)
- 10.3 Maintenance
- 10.4 Leachate Disposal
- 10.5 Maintenance Costs

11.0 Emergency Contingency Plan
- 11.1 Emergency Spill Response
- 11.2 Fire / Explosion
- 11.3 Personal Injury
- 11.4 Toxic Exposures
- 11.5 Public Notification
- 11.6 Emergency Telephone Numbers, Map and Directions to Nearest Health Facility.

12.0 Record Drawings
- 12.1 AutoCAD Drawings on Disk

13.0 ROD(s), Consent Orders, and / or any Explanation of Significant Differences (ESDs)

14.0 Electronic Copies of Official Records and References

APPENDIX 7A

Index to New York State Standards, Criteria, and Guidance

I. NEW YORK STATE REQUIREMENTS

NEW YORK STATE DEPARTMENT OF ENVIRONMENT CONSERVATION

Division of Environmental Remediation

ECL Article 17, Title 3 - Jurisdiction of the Department; Authority; Powers and Duties
ECL Article 17, Title 10 - Control of the Bulk Storage of Petroleum
ECL Article 27, Title 13 - Inactive Hazardous Waste Disposal Sites
ECL Article 37, Title 1 - Substances Hazardous to the Environment
ECL Article 40, Title 1 - Hazardous Substances Bulk Storage Act
ECL Article 52, Title 3 - Hazardous Waste Site Remediation Projects
ECL Article 56, Titles 1 and 5 - Environmental Restoration Projects ("Brownfields")
Navigation Law Article 12 - Oil Spill Prevention, Control, and Compensation

6 NYCRR Part 375 - Inactive Hazardous Waste Disposal Sites (as amended January 1998)
6 NYCRR Part 611 - Environmental Priorities and Procedures in Petroleum Cleanup and Removal
6 NYCRR Part 612 - Registration of Petroleum Storage Facilities (February 1992)
6 NYCRR Part 613 - Handling and Storage of Petroleum (February 1992)
6 NYCRR Part 614 - Standards for New and Substantially Modified Petroleum Storage Tanks (February 1992)
6 NYCRR Part 595 - Releases of Hazardous Substances (August 1994)
6 NYCRR Part 596 - Hazardous Substances Bulk Storage
6 NYCRR Part 597 - List of Hazardous Substances
6 NYCRR Part 598 - Handling and Storage of Hazardous Substances
6 NYCRR Part 599 - Standards for New or Substantially Modified Hazardous Substance Storage Facilities
17 NYCRR Part 32 - Oil Spill Prevention and Control: Actions to be Taken in Case of Discharge

TAGM 4007 - Phase II Investigation Generic Workplan (May 1988)
TAGM 4013 - Emergency Hazardous Waste Drum Removal/ Surficial Cleanup Procedures (March 1996)
TAGM 4015 - Policy Regarding Alteration of Groundwater Samples Collected for Metals Analysis (Sep 1988)
TAGM 4018 - Phase I Investigations (Nov 1988)
TAGM 4023 - Citizen Participation Plan (Dec 1989)
TAGM 4025 - Guidelines for Remedial Investigation/ Feasibility Studies (March 1989)
TAGM 4027 - Assistance for Contaminated Private and Public Water Supplies (April 1994)
TAGM 4030 - Selection of Remedial Actions at Inactive Hazardous Waste Sites (May 1990)
TAGM 4031 - Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites (Oct 1989)
TAGM 4032 - Disposal of Drill Cuttings (November 1989)
TAGM 4033 - Inactive Sites Interface with Sanitary Landfills (December 1989)
TAGM 4036 - Landfill Regulatory Responsibility (March 1990)
TAGM 4038 - Remediation of Inactive Hazardous Waste Disposal Sites (April 1990)
TAGM 4042 - Interim Remedial Measures (June 1992)
TAGM 4046 - Determination of Soil Cleanup Objectives and Cleanup Levels (January 1994)
TAGM 4048 - Interim Remedial Measures - Procedures (December 1992)
TAGM 4053 - Obtaining Property Access for Investigation, Design, Remediation and Monitoring/ Maintenance (Sep 1993)
TAGM 4056 - Remedial Action by PRPs (April 1995)
TAGM 4058 - Environmental Restoration (Brownfields) - Investigation and Remediation Projects (Dec 1997)

TAGM 4059 - Making Changes To Selected Remedies (May 1998)
Citizen Participation in New York's Hazardous Waste Site Remediation Program: A Guidebook (June 1998)
Groundwater Monitoring Well Decommissioning Procedures (May 1995)
STARS #1 - Petroleum-Contaminated Soil Guidance Policy
STARS #2 - Biocell and Biopile Designs for Small-Scale Petroleum-Contaminated Soil Projects
SPOTS #14 - Site Assessments at Bulk Storage Facilities (August 1994)
Spill Response Guidance Manual (1990)
Permanent Closure of Petroleum Storage Tanks (July 1988)
NYS Water Quality Accident Contingency Plan and Handbook:
Chapter 200 Response Phase II, Containment and Countermeasures
Chapter 300 Response Phase III, Recovery, Cleanup and Debris Disposal
Sampling Guidelines and Protocols (September 1992)
Cold-Mix Asphalt BUD Approval Procedures and Criteria (May 1993)

Division of Solid and Hazardous Materials

ECL Article 27 - Collection, Treatment and Disposal of Refuse and Other Solid Waste

6 NYCRR Part 360 - Solid Waste Management Facilities (March 1998)
6 NYCRR Part 364 - Waste Transporter Permits (November 1998)
6 NYCRR Part 370 - Hazardous Waste Management System: General (November 1998)
6 NYCRR Part 371 - Identification and Listing of Hazardous Wastes (November 1998)
6 NYCRR Part 372 - Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
6 NYCRR Subpart 373-1 - Hazardous Waste Treatment, Storage and Disposal Facility Permitting Requirements (November 1998)
6 NYCRR Subpart 373-2 - Final Status Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities (November 1998)
6 NYCRR Subpart 373-3 - Interim Status Standards for Owners and Operators of Hazardous Waste Facilities (November 1998)
6 NYCRR Subpart 373-4 - Facility Standards for the Collection of Household Hazardous Waste and Hazardous Waste from Conditionally Exempt Small Quantity Generators (November 1998)
6 NYCRR Subpart 374-1 - Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)
6 NYCRR Subpart 374-2 - Standards for the Management of Used Oil (November 1998)
6 NYCRR Subpart 374-3 - Standards for Universal Waste (November 1998)
6 NYCRR Part 376 - Land Disposal Restrictions

TAGM 3028 - "Contained In" Criteria for Environmental Media: Soil Action Levels (August 1997)
TAGM 3038 - Active Waste Management (February 1993)

Division of Water

ECL Article 17, Title 8 - State Pollutant Discharge Elimination System
6 NYCRR Parts 700-706 - Water Quality Standards (June 1998)
6 NYCRR Part 750 through 758 - Implementation of NPDES Program in NYS ("SPDES Regulations")

TOGS 1.1.1 - Ambient Water Quality Standards & Guidance Values
TOGS 1.1.2 - Groundwater Effluent Limitations
TOGS 1.2.1 - Industrial SPDES Permit Drafting Strategy for Surface Waters
TOGS 1.3.1 - Waste Assimilative Capacity Analysis & Allocation for Setting Water Quality Based Effluent Limits
TOGS 1.3.1C - Development of Water Quality Based Effluent Limits for Metals Amendment
TOGS 1.3.2 - Toxicity Testing in the SPDES Permit Program
TOGS 1.3.4 - BPJ Methodologies
TOGS 1.3.4.a - BPJ Methodologies/Amendments
TOGS 1.3.7 - Analytical Detectability & Quantitation Guidelines for Selected Environmental Parameters
TOGS 1.3.8 - New Discharges to Publicly Owned Treatment Works
TOGS 2.1.2 - Underground Injection/Recirculation (UIR) at Groundwater Remediation Sites
TOGS 2.1.3 - Primary & Principal Aquifer Determinations

Division of Fish and Wildlife and Marine Resources

ECL Article 11 - Fish and Wildlife
ECL Article 15, Title 5 - Protection of Water
ECL Article 15, Title 27 - Wild, Scenic and Recreational Rivers System
ECL Article 24 - Freshwater Wetlands
ECL Article 25 - Tidal Wetlands
ECL Article 11-0325 Control of dangerous diseases (Fish consumption advisory)

6 NYCRR Part 175 - Special Licenses and Permits--Definitions and Uniform Procedures
6 NYCRR Part 182 - Endangered & Threatened Species of Fish & Wildlife
6 NYCRR Part 608 - Use and Protection of Waters
6 NYCRR Part 661 - Tidal Wetlands - Land Use Regulations
6 NYCRR Part 662 - Freshwater Wetlands - Interim Permits
6 NYCRR Part 663 - Freshwater Wetlands - Permit Requirements
6 NYCRR Part 664 - Freshwater Wetlands Maps and Classification
6 NYCRR Part 665 - Local Government Implementation of the Freshwater Wetlands Act and Statewide Minimum Land-Use Regulations for Freshwater Wetlands
6 NYCRR Part 666 - Administration and Management of the Wild, Scenic and Recreational Rivers System in New York State Excepting the Adirondack Park
19 NYCRR Part 600 Policy and Procedures

Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites (October 1994)
Technical Guidance for Screening Contaminated Sediments (January 1999)
Freshwater Wetlands Regulations - Guidelines on Compensatory Mitigation (October 1993)
Niagara River Biota Contamination Project: Fish Flesh Criteria for Piscivorus Wildlife (July 1987)
Wildlife Toxicity Assessment for Cadmium in Soils (May 1999)
Contaminant Trackdown Studies: Standard Operating Procedures (1999)
Fish Collection and Preparation Procedures and Data Dictionary
Final Environmental Impact Statement for Policy on Contaminants in Fish (October 1985)

Division of Air Resources

Air Guide 1 - Guidelines for the Control of Toxic Ambient Air Contaminants
6 NYCRR Part 200 - General Provisions
6 NYCRR Part 201 - Permits and Certificates
6 NYCRR Part 211 - General Prohibitions
6 NYCRR Part 212 - General Process Emission Sources
6 NYCRR Part 227 - Stationary Combustion Installations
6 NYCRR Part 231 - New Source Review in Non-attainment Areas and Ozone Transport Regions
6 NYCRR Part 257 - Air Quality Standards

Division of Environmental Permits

ECL Article 27, Title 2 - Industrial Siting Hazardous Waste Facilities

6 NYCRR Part 364 - Waste Transporter Permits
6 NYCRR Part 361 - Siting of Industrial Hazardous Waste Facilities
6 NYCRR Part 621 - Uniform Procedures
6 NYCRR Part 624 - Permit Hearing Procedures

Division of Mineral Resources

ECL Article 23 Title 27 - NYS Mined Land Reclamation Law
ECL Article 23 and Article 71, Title 13 - Oil, Gas and Solution Mining Law

6 NYCRR Part 420 - General definitions and scope
6 NYCRR Part 421 - Permits
6 NYCRR Part 422 - Mined Land - Use Plan
6 NYCRR Part 423 - Reclamation Bond
6 NYCRR Part 424 - Enforcement
6 NYCRR Part 425 - Civil Penalties
6 NYCRR Part 426 - Hearings
6 NYCRR Part 550 - Promulgations and Enforcement of Rules and Regulations
6 NYCRR Part 551 - Reports and Financial Security
6 NYCRR Part 552 - Permits to Drill, Deepen, Plug Back or Convert Wells
6 NYCRR Part 553 - Well Spacing
6 NYCRR Part 554 - Drilling Practices and Reports
6 NYCRR Part 555 - Plugging and Abandonment
6 NYCRR Part 556 - Operating Practices
6 NYCRR Part 557 - Secondary Recovery and Pressure Maintenance
6 NYCRR Part 558 - Transportation
6 NYCRR Part 559 - "Bass Island" Regulations

NEW YORK STATE DEPARTMENT OF HEALTH

Article 11 of the Public Health Law - Public Water Supplies; Sewerage and Sewage Control
Article 13 of the Public Health Law, Title XII-A - Inactive Hazardous Waste Disposal Sites

10 NYCRR Part 5 of the State Sanitary Code - Drinking Water Supplies (May 1998)
Appendix 5-A of Part 5 of the State Sanitary Code (Recommended Standards for Water Works)
Appendix 5-B of Part 5 of the State Sanitary Code (Rural Water Supply)

10 NYCRR Part 16 - Draft limits on the Disposal of Radioactive Materials into Sewer Systems
10 NYCRR Part 67 - Lead
10 NYCRR Part 170 - Water Supply Sources

The Binghamton State Office Building Cleanup Criteria for PCDDs, PCDFs & PCBs
NYSDOH Tetrachloroethene Ambient Air Criteria Document (October 1997)
NYSDOH Background Indoor/Outdoor Air Levels of VOCs in Homes Between 1989 and 1996 (August 1997)
NYSDOH News Release on Dioxin in Fish from Lake Ontario (August 1981)
The 1 ppm Health Advisory Guideline for Cadmium in Sportfish Flesh (NYSDOH, 1994)
Health Advisories: Chemicals in Game and Sportfish (NYSDOH, updated annually)
NYSDOH Interim Report on Point-of-Use Activated Carbon Treatment (December 1982)
NYSDOH PWS 68 - Blending Policy for Use of Sources of Drinking Water
NYSDOH PWS 69 - Organic Chemical Action Steps for Drinking Water
NYSDOH PWS 152 - Procedure for Handling Community Water System Emergencies
NYSDOH PWS 159 - Responding to Organic Chemical Concerns at Public Water Systems
NYSDOH PWS 160 - Public Notification of Organic Chemical Incidents Regarding Public Water Supplies

NEW YORK STATE DEPARTMENT OF STATE

Division of Coastal Resources

Article 42 of the Executive Law - Waterfront Revitalization and Coastal Resources Act
19 NYCRR Part 600 - Waterfront Revitalization and Coastal Resources

Federal Consistency Process
State Consistency Process
NYS Coastal Management Program Policies
Federal Register - Part V - Department of Commerce
Federal Consistency Regulation (6/25/97)

II. FEDERAL REQUIREMENTS

16 USC 470 - National Historic Preservation Act
16 USC 661 - Fish and Wildlife Coordination Act
33 USC 1341 - Water Quality Certification (Section 401 of the Federal Water Pollution Control Act)

U.S. ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 60 Subpart WWW - Standards of Performance for Municipal Solid Waste Landfills
40 CFR 112 - Oil Pollution Prevention (July 1983)
40 CFR Part 144 - Underground Injection Control (UIC) Program
40 CFR Part 230 - Guidelines for Specifications of Disposal Sites for Dredged or Fill Material
40 CFR Part 280 - Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks
40 CFR Part 761 - Polychlorinated Biphenyls (PCBs): Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions (July 1998)

Hydrologic Evaluation of Landfill Performance (HELP) - Model
Hydrologic Simulation of Solid Waste Disposal Sites
Solidification/Stabilization and its Application to Waste Materials
Integrated Risk Information System (IRIS)

Risk Assessment Guidance for Superfund, Volume 1 - Human Health Evaluation Manual (December 1989)
Spill Response Policy
EPA Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (Interim Final, June 1997)
EPA Guidelines for Ecological Risk Assessment (April 1998)
USEPA National Ambient VOCs Database (updated 1988)
Guidance on Residential Lead-Based Paint, Lead Contaminated Dust and Lead Contaminated Soil
OSWER Directive 9355.3-01 - Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (October 1988)
OSWER Directive 9200.4-17 - Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (November 1997)

U.S. DEPARTMENT OF LABOR

OSHA/PESH

29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response

U.S. ARMY CORP OF ENGINEERS

Executive Order 11990 - Protection of Wetlands
33 USC 466 Section 404 - Clean Water Act
33 CFR Parts 320 -330 - Regulatory Programs of the Corps of Engineers

APPENDIX 7B

Permit Exemptions

In accordance with Subsection 7.3, exemptions from the following permit programs, without limitation, may be granted to the person responsible for conducting the investigation and/or remediation projects covered in this technical guidance document:

1. Air - Title 5 permits
2. Air - State permits
3. Air - Registrations
4. Ballast Discharge
5. Chemical Control
6. Coastal Erosion Hazard Areas
7. Construction of Hazardous Waste Management Facilities
8. Construction of Solid Waste Management Facilities
9. Dams
10. Excavation and Fill in Navigatable Waters
11. Flood Hazard Area Development
12. Freshwater Wetland
13. Hazardous Waste
14. Long Island Wells
15. Mined Land Reclamation
16. Navigation Law - Docks
17. Navigation Law - Floating Objects
18. Navigation Law - Marinas
19. Non-Industrial Waste Transport
20. Operation of Solid Waste Management Facilities
21. Operation of Hazardous Waste Management Facilities
22. State Pollution Discharge Elimination Systems (SPDES)
23. Stream Disturbance
24. Tidal Wetlands
25. Water Quality Certification
26. Water Supply
27. Wild, Scenic and Recreational Rivers